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LMSD-6134

12 AUGUST 1958

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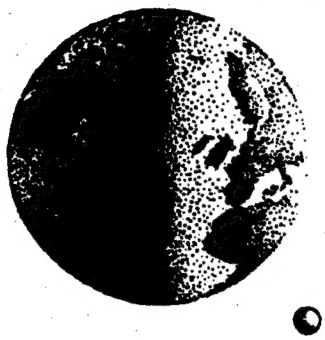

WS 117L

SENTRY SYLLABUS

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION
SUNNYVALE, CALIFORNIA

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FOREWORD

The chart and photograph reproductions which comprise this report are pertinent to a presentation made to Mr. Roy W. Johnson, Director, Advanced Research Projects Agency, and members of his staff. Essentially, the presentation was given in two parts:

> Part I .... a detailed technical briefing on the Sentry Weapon System 117L as currently programmed or proposed, and
>
> Part II ... a discussion of advanced component requirements and possible system applications to other programs.

Information pertinent to the system is presented herein. The presentation was given at the Pentagon on 14 and 15 August 1958.

117L/ARPA BRIEFING
14-15 August 1958
Pentagon, Room 3E144

Thursday 14 August

0900	Introduction - Mission Concept	Lt. Col. Lee Battle
0910	Sentry System Program	J. H. Carter
0925	System Development Plan	F. W. O'Green
0940	Present Status	
	Support Systems	R. D. King
	Facilities and GSE	
	Recovery	
	Operations Control Plan	
1020	Break	
1040	Subsystems	
	Airframe	F. W. O'Green
	Propulsion	F. W. O'Green
	Guidance and Control	F. W. O'Green
	Power	C. W. Burrell
1200	Lunch	
1300	Visual	F. W. O'Green
	Biomedical	F. W. O'Green
	Ferret	P. D. Doersam
	Infrared	J. J. Knopow
	Communications	J. G. Schaub
	Data Control	J. G. Schaub
1430	Break	
1450	Film: Progress Report No. 7	
1510	Questions	
1600	Brochure	
1615	Conclude	

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117L/ARPA BRIEFING
14-15 August 1958
Pentagon, Room 3E144

Friday 15 August

0900	Advanced Components	
	Power	C. W. Burrell
0930	TV Sensing	Peter C. Goldmark
1000	Ferret	P. D. Doersam
1015	Infrared Detection & Tracking	J. J. Knopow
1035	Break	
1055	Data Storage	J. P. Nash
1125	Propulsion	J. E. Laurance
1200	Lunch	
1300	Other Applications of the Sentry System	
	General Satellite Tracking }	J. Jenkins
	Communications }	
1330	Weather	E. V. Stearns
1345	Scientific Measurements	F. S. Johnson
1400	Break	
1420	MIS	J. W. Brandon
1440	AICBM	S. H. Browne
1500	Summary	J. H. Carter
1520	Conclude	

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CHART REPRODUCTIONS:

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P14(4)	Advanced Reconnaissance System Evolution
P799	Sentry Operational Objectives
P250(3)	WS117L Program Objectives
P257(5)	WS117L Development Program
P102(5)	Sentry Facilities
P800	Sentry Payload - Defined
P238(3)	The Sentry Subsystems
P283(5)	WS117L R&D Organization
P566	WS117L Airframe and Propulsion
P567	WS117L Payload
P568	WS117L Ground Support Equipment
P565	Lockheed Facilities for WS117L
P235(1)	WS117L Trajectory to Orbit
P229(1)	WS117L Orbital Test Vehicle Design Parameters - Booster Stage
P228(1)	WS117L Orbital Test Vehicle Design Parameters - Sustainer Stage
P792	Altitude vs. Payload - Sentry/Thor
P791	Altitude vs. Payload - Sentry/Atlas
P171(3)	WS117L Ground Traces of 83° Orbits

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P232(2)	WS117L Vehicle System
P468(1)	WS117L Structural Breakdown
P422(2)	WS117L Propulsion System
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P262(3)	WS117L Satellite Vehicle Weight Analysis
P400	WS117L Visual Reconnaissance System
P175(4)	WS117L Ferret Subsystem - Project Structure
P182(3)	Airborne Reception
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P609(1)	ICBM Attack Alarm System - Satellite Power Requirements vs. Supply
P620(1)	ICBM Attack Alarm System - Vehicle Payload
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P509(2)	Station Locations - Thor
P513(3)	Station Locations - Atlas

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P163(2)	G-S Communications Intercept Station
P540	Orbiting Object - Traffic Intelligence
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P653	WS117L Data Control - Reconnaissance Mission Assignment
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P545	Types of Weather Data
P374	Possible Scientific Experiments

PHOTOGRAPH REPRODUCTIONS:

Photo No.	
P3017	Flight Test Vehicles Nos. 1 and 2 in Mod & Checkout - LMSD Palo Alto
P3018	Flight Test Vehicles Nos. 1 and 2 in Mod & Checkout - LMSD Palo Alto

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P3022	Flight Test Vehicle No. 2 in Mod & Checkout - LMSD Palo Alto
P3021	Flight Test Vehicle No. 2 in Mod & Checkout - LMSD Palo Alto
P3039	Model XLR Engines - JP4 and UDMH
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P2862	Horizon Scanner
P2864	Horizon Scanner
P3046	Systems Checkout Complex (excluding LACE Unit)
P3047	LACE Unit (Systems Checkout Complex)

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ADVANCED RECONNAISSANCE VEHICLE

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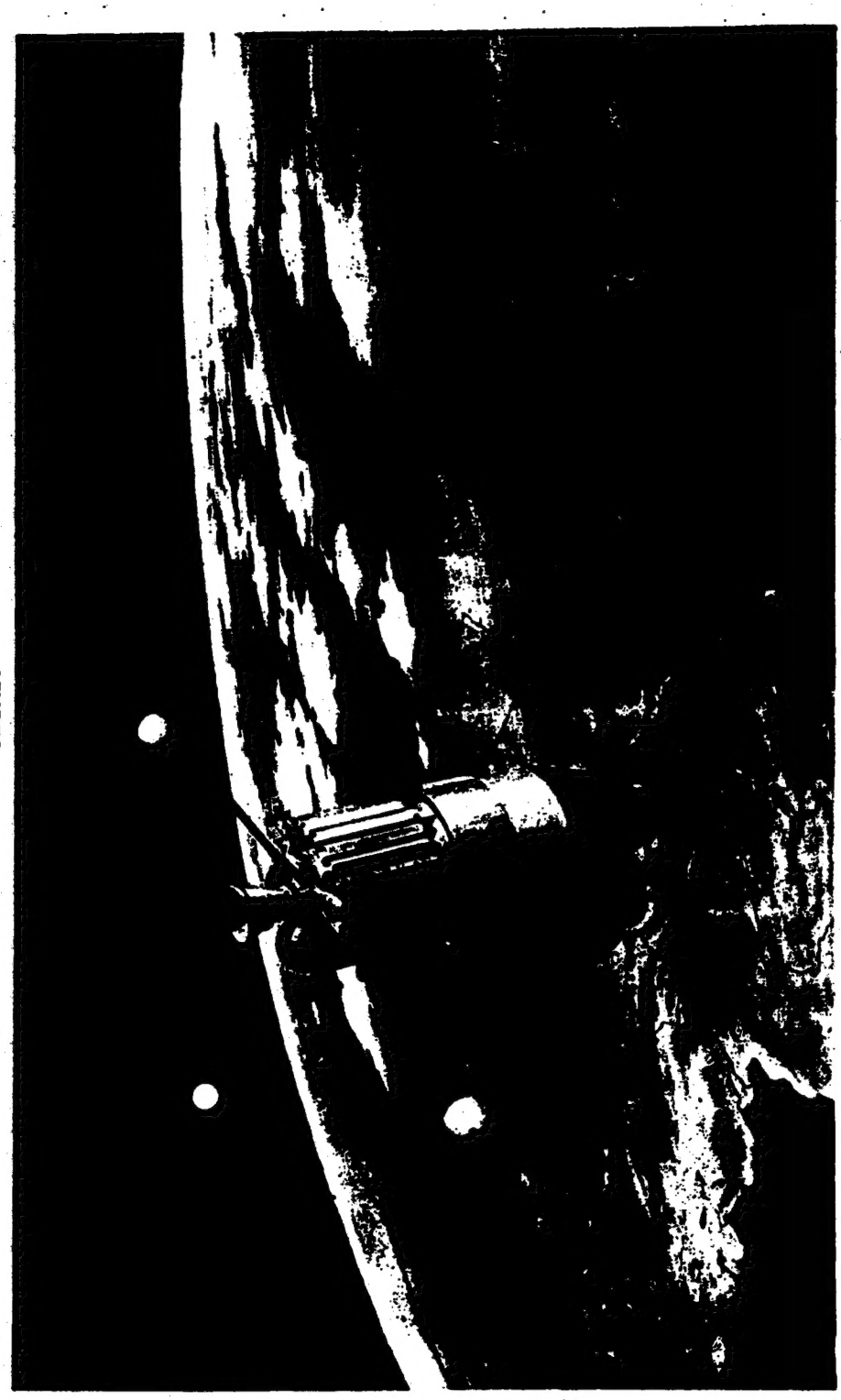

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

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P142 (2) 8 10/22/57
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ADVANCED RECONNAISSANCE SYSTEM EVOLUTION

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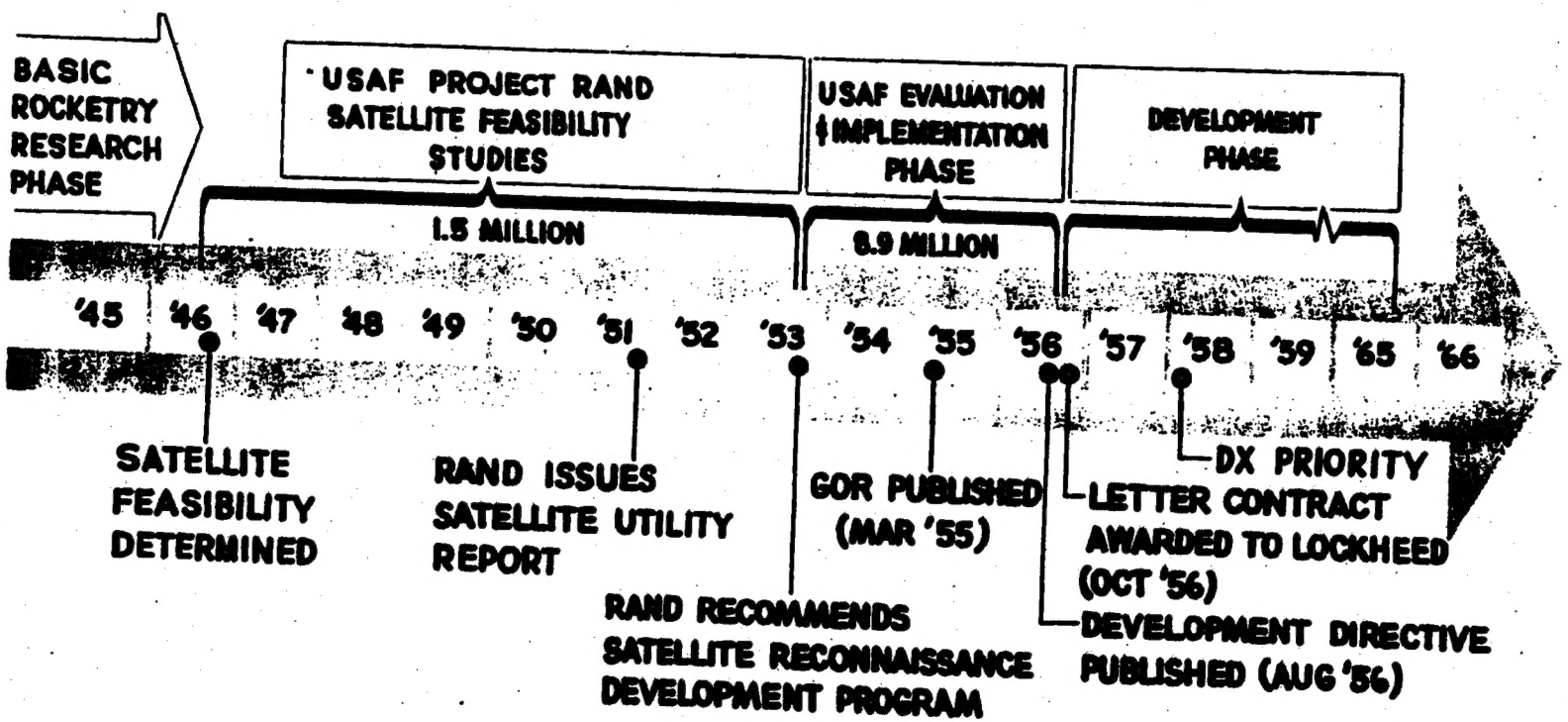

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MISSILE SYSTEMS DIVISION

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SENTRY OPERATIONAL OBJECTIVES

VISUAL RECONNAISSANCE

- MAPPING OF USSR AND SATELLITES
- * STRATEGIC WARNING INDICATIONS
  - -WEAPONS AND BASES IN BEING
  - -MILITARY LOGISTICS
  - -INDUSTRIAL WAR CAPABILITIES
- NUCLEAR DETONATION DETECTION
- WEATHER OBSERVATION

*OPEN SKY NATIONAL OBJECTIVES

ELECTRONIC RECONNISSANCE

* DETECT & OBTAIN INFORMATION ON ELECTRONIC EMITTERS IN AREAS OF USSR & SATELLITES NOT NOW AVAILABLE

INFRARED RECONNAISSANCE

* ICBM ATTACK WARNING

COMMUNICATIONS

* SATELLITE LINKS FOR SECURE & RAPID GLOBAL COMMUNICATIONS

P 799
WD-58-05183

8/8/58

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PROGRAM TITLE	MAJOR DEVELOPMENT OBJECTIVES
I. ENGINEERING PROTOTYPE DEVELOPMENT & TESTS	PLACE STABILIZED SATELLITES ON ORBIT AT 300 S.M. ALTITUDE TEST RECONNAISSANCE PAYLOAD AND GENERAL SYSTEM OPERATIONS
II. PIONEER VISUAL RECONNAISSANCE	PROVIDE SMALL SCALE PHOTOGRAPHIC COVERAGE OF USSR SATELLITE-BORNE FILM PROCESSING; VIDEO TRANSMISSION OF PHOTO IMAGES 100 X 1300 MILE PHOTO STRIP PER PASS AVERAGE 100 FT. RESOLUTION 1 MILE TARGET LOCATION ACCURACY
II A. EARLY ACHIEVEMENT OF ORBITAL CAPABILITY TEST CAPSULE RECOVERY SYSTEM	PLACE SATELLITES ON POLAR ORBIT. INCORPORATE RECOVERABLE CAPSULE IN SELECTED SATELLITES FOR BIOMEDICAL RESEARCH PURPOSES.
III. PIONEER FERRET RECONNAISSANCE	INTERCEPT USSR ELECTROMAGNETIC EMISSIONS IN THE 50-10,000 MCS SPECTRUM RECEIVE AND MEASURE BASIC SIGNAL PARAMETERS; 50-100 MILE LOCATION ACCURACY SORT KNOWN SIGNALS FROM UNKNOWN SIGNALS PROVIDE GUIDANCE FOR DESIGN OF ADVANCED FERRET EQUIPMENTS
IV. ADVANCED VISUAL RECONNAISSANCE	PROVIDE HIGH RESOLUTION PHOTOGRAPHS OF SPECIFIC GROUND TARGETS 17 MILE SWATH WIDTH 20 FT. RESOLUTION 1/2 MILE TARGET LOCATION ACCURACY
V. ADVANCED FERRET RECONNAISSANCE	MORE ACCURATELY DETERMINE PARAMETERS OF ELECTRONIC SIGNALS FREQUENCY RANGE: 50-40,000 MCS
VI. VISUAL SURVEILLANCE	SIMILAR TO PROGRAM IV, BUT USING: LONG DURATION POWER SUPPLY MULTIPLE VEHICLES HIGHER RESOLUTION HIGH SPEED GROUND TRANSMISSION OF DATA POSSIBLY SUBSTITUTE TV WITH TAPE RECORDING FOR FILM
VII. INFRARED SURVEILLANCE	PROVIDE SATELLITE SYSTEM TO FURNISH INSTANTANEOUS WARNING OF AN ICBM ATTACK LATER SATELLITE SYSTEM TO PROVIDE PRECISION AICBM DETECTION-PREDICTION DATA
VIII. FERRET SURVEILLANCE	SIMILAR TO PROGRAM V, BUT USING: MULTIPLE FUNCTIONS AND FLEXIBILITY EMPLOYS MULTIPLE VEHICLES LONG DURATION POWER SUPPLY IMMINENCE OF HOSTILITIES WARNING

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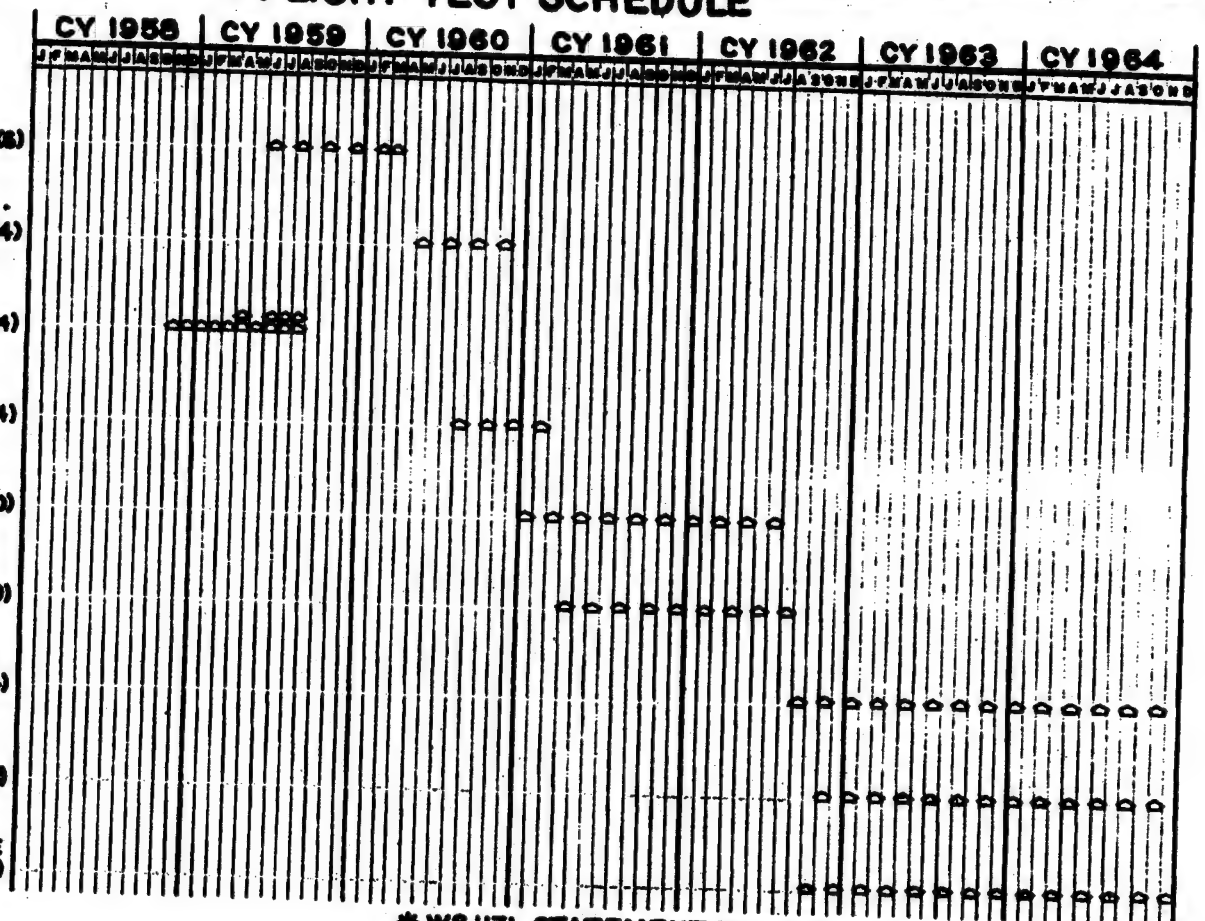
* FLIGHT TEST SCHEDULE



P257 (5)-3-7/22/58
WD-58-02843

* WS 117L STATEMENT OF WORK, AFBMO, 16 APRIL 1958
AS AMENDED 7 JULY 1958

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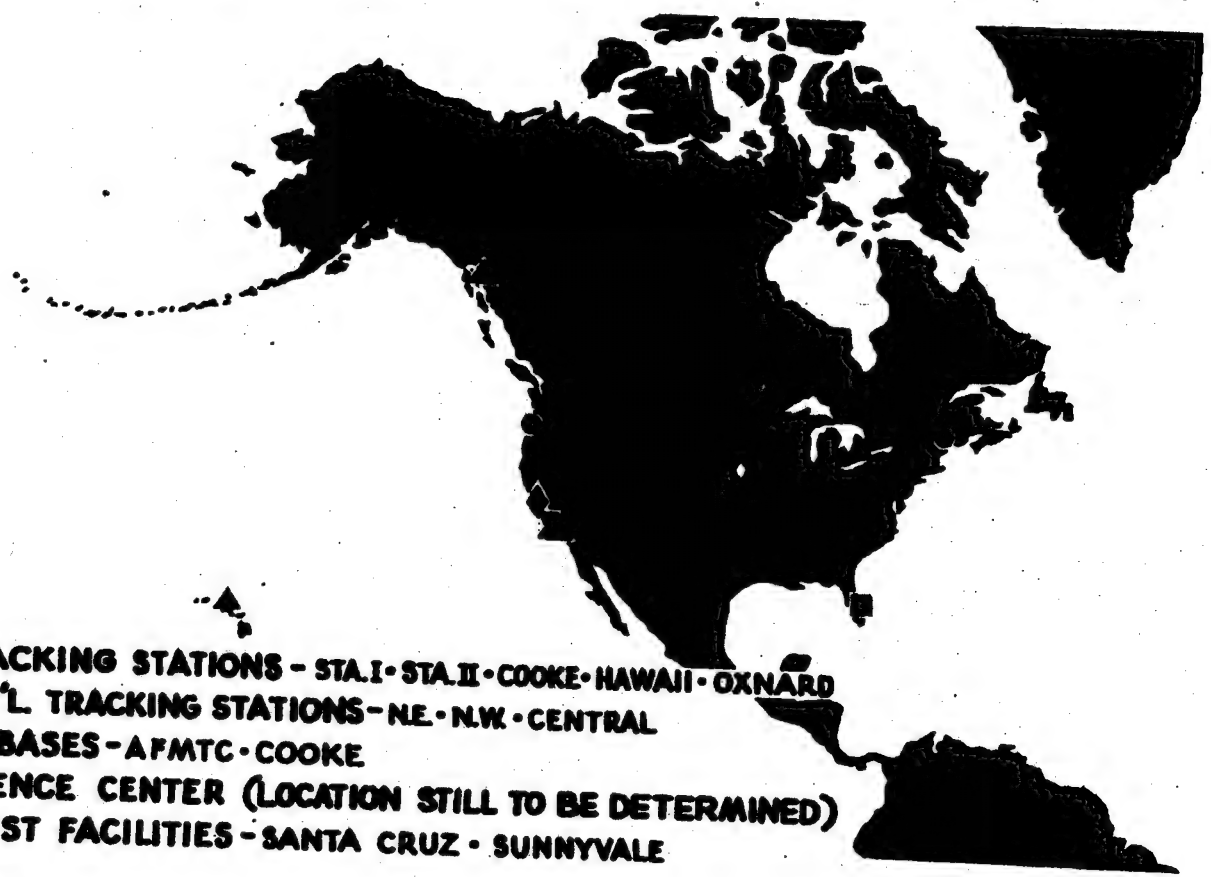
SENTRY FACILITIES



LEGEND

- ▲ TEST TRACKING STATIONS - STA.I • STA.II • COOKE • HAWAII • OXNARD
- ● DEV./OPN'L. TRACKING STATIONS - N.E. • N.W. • CENTRAL
- ■ LAUNCH BASES - AFMTC • COOKE
- ◇ INTELLIGENCE CENTER (LOCATION STILL TO BE DETERMINED)
- ◆ LMSD TEST FACILITIES - SANTA CRUZ • SUNNYVALE

P102 (5) SO 5/2/58
WD-58-02843

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LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

SENTRY PAYLOAD - DEFINED

RECONNAISSANCE MISSIONS:

- ALL SENSING, PROCESSING & STORAGE EQUIPMENT
- ALL RELATED AUXILIARY POWER SYSTEM EQUIPMENT
- ALL RELATED COMMUNICATIONS EQUIPMENT

BIOASTRONAUTIC RECOVERY MISSIONS:

- RECOVERY CAPSULE & ROCKET
- CAPSULE CARGO

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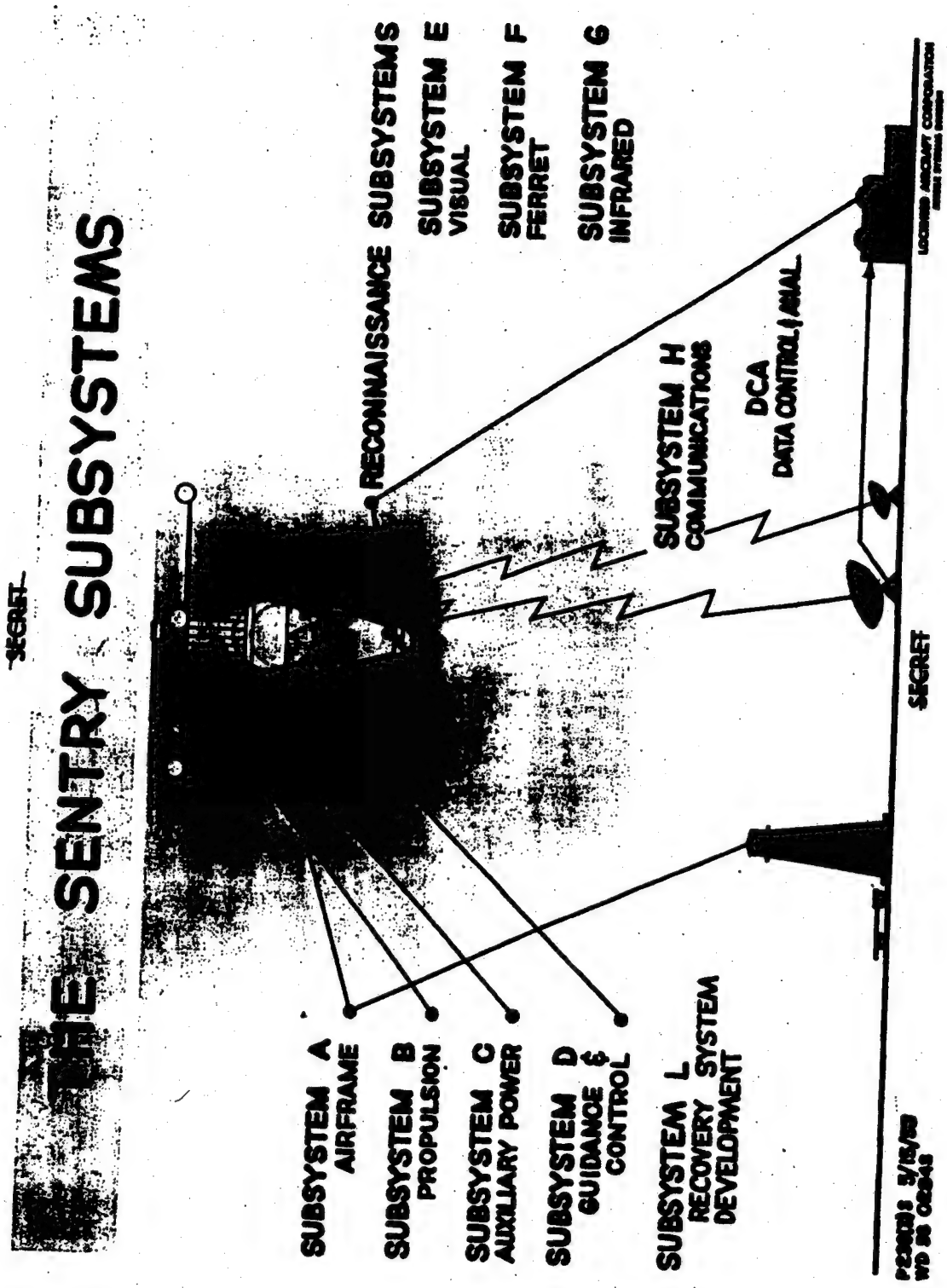

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WS117L R&D ORGANIZATION

LOCKHEED AIRCRAFT CORP. MISSILE SYSTEMS DIVISION
WEAPON SYSTEM CONTRACTOR

RESEARCH & ANALYSIS
ANTENNA DEVELOPMENT
TELEMETRY

AIRFRAME FABRICATION
CHECKOUT & ASSEMBLY
STATIC & FLIGHT TESTS

PRINCIPAL SUBCONTRACTORS

PROPULSION
- BELL AIRCRAFT CORP.
- AEROJET-GENERAL CORP.

AUXILIARY POWER
- SONOTONE CORP.
- EAGLE-PICHER CO.
- ENGINEERED MAGNETICS
- HOFFMAN ELECTRONICS CORP.
- BEECHCRAFT R&D INC.

GUIDANCE & CONTROL
- DETROIT CONTROLS CORP.
  REEVES INSTRUMENT CORP.
- MINNEAPOLIS-HONEYWELL REGULATOR CO.
- BENDIX AVIATION CORP.

VISUAL RECONN.
- EASTMAN KODAK CO.
  COLUMBIA BROADCASTING SYS.
  SPICA INC.
- AMPEX CORP.

FERRET
- AIRBORNE INSTRUMENTS LAB. INC.
- HALLER, RAYMOND & BROWN INC.

INFRARED RECONN.
- EASTMAN KODAK CO.
- BAIRD ATOMIC CO.
- AEROJET-GENERAL CORP.
- GENERAL MILLS INC.

GROUND-SPACE COMM.
- PHILCO CORP.
  REEVES INSTRUMENT CORP.
  RADIATION INC.
- LOCKHEED AIRCRAFT SERVICES INC.
- HUGHES AIRCRAFT CO.
- TEXAS INSTRUMENT CORP.

TEST MGMT & OPERATIONS
- AEROJET-GENERAL CORP.
- RALPH M. PARSONS CO.

GROUND SUPPORT EQUIP.
- OTIS ELEVATOR CO.
- CONSOLIDATED AVIONICS CORP.
- BEMCO, INC.
- STANDARD MFG. CO. INC.
- HUFFORD CORP.

BIO MEDICAL CAPSULE
- GENERAL ELECTRIC CO.
- ALL AMERICAN ENGINEERING CO.

ASSOCIATE CONTRACTORS

BOOSTERS
- DOUGLAS A/C CORP. (SM-75)
- CONVAIR ASTRONAUTICS (SM-65)

GUIDANCE & CONTROL
- INSTRUMENTATION LAB., MIT
- GENERAL ELECTRIC CO.

AUXILIARY POWER
- THE MARTIN CO.
- ATOMICS INTERNATIONAL

DATA PROCESSING
- RAMO-WOOLDRIDGE CORP.

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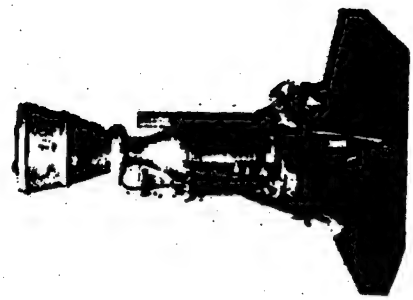
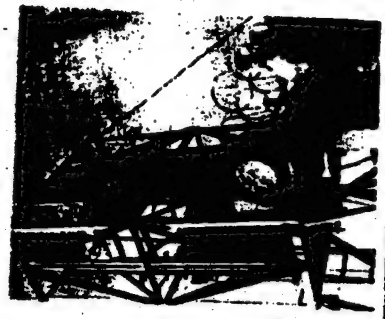
FUNCTIONAL MOCK UP



BELL ENGINE

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

AIRFRAME



PROPULSION CHECK OUT

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MOCK UP

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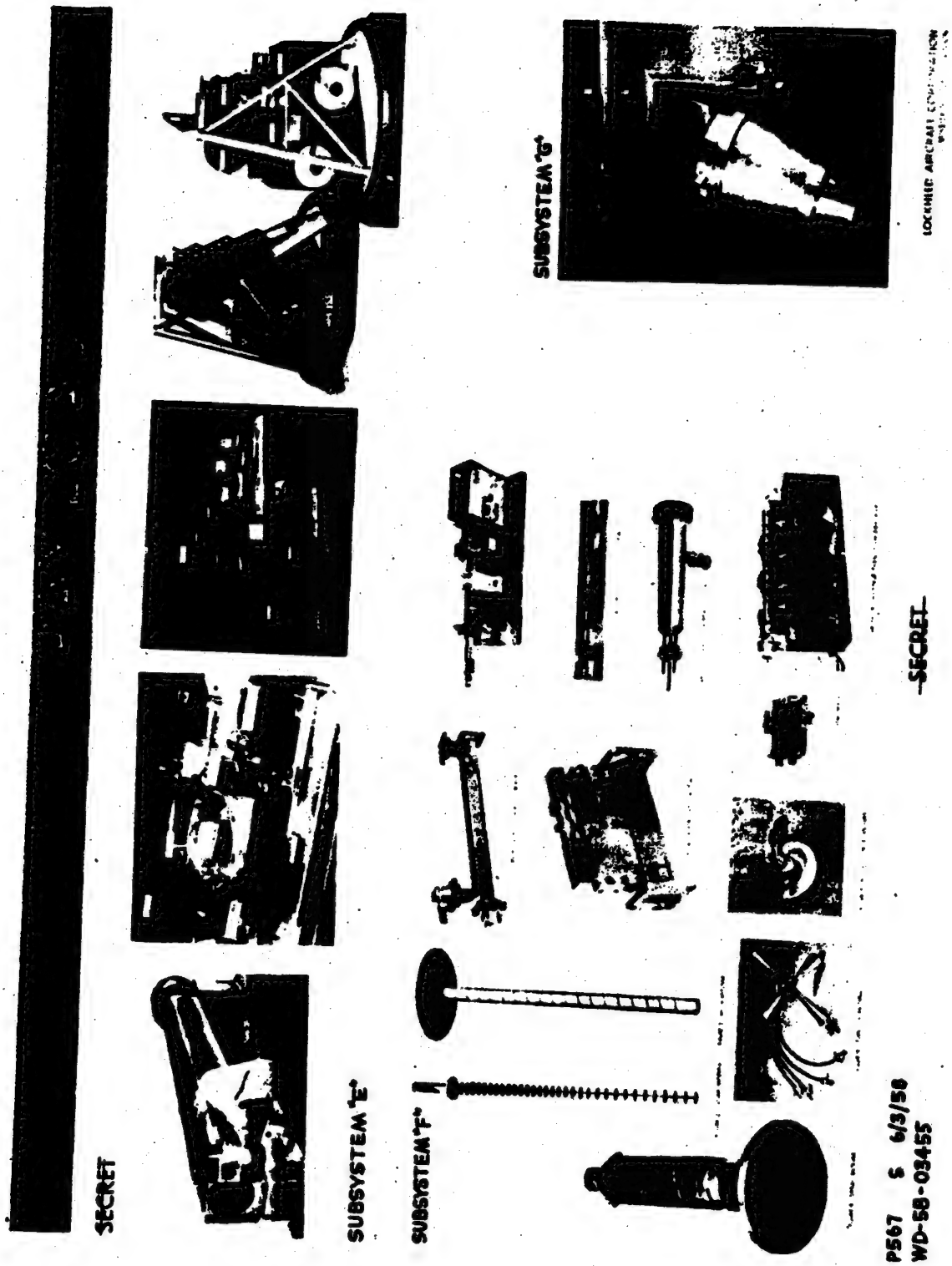

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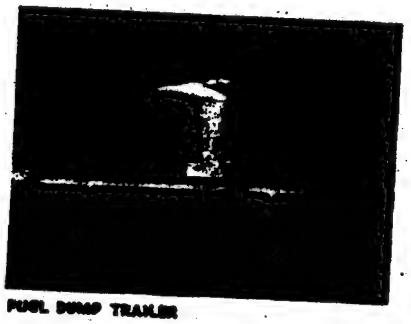
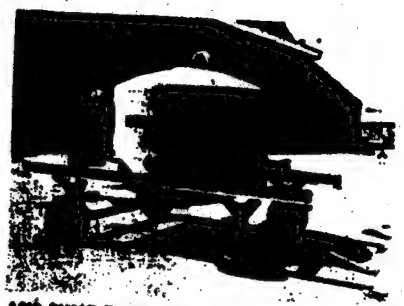
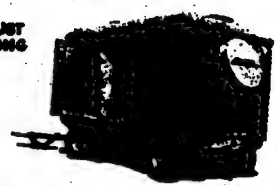


FUEL DUMP TRAILER

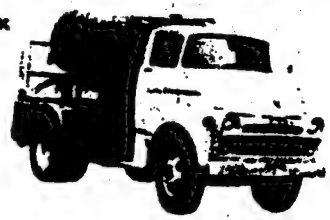


ACID DUMP TRAILER

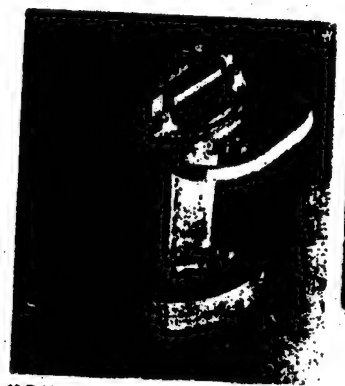
ENGINE THRUST CHAMBER FLUSHING



FUEL TRUCK

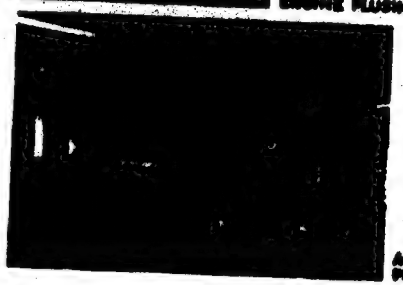


ENGINE FLUSHING TRAILER



UDMH LOADER

PROPULSION CHECKOUT CONSOLE
MODIFIED BELL UNIT



ACID TRAILER AND
FLUSHING TRUCK

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

P.568 GSE 6/3/58
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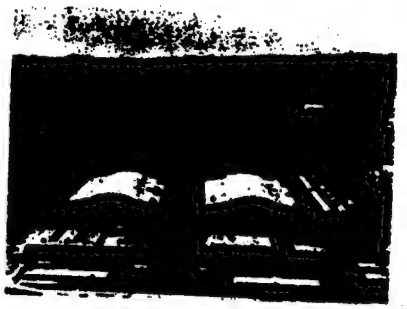
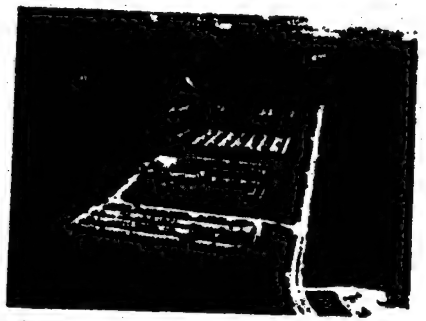
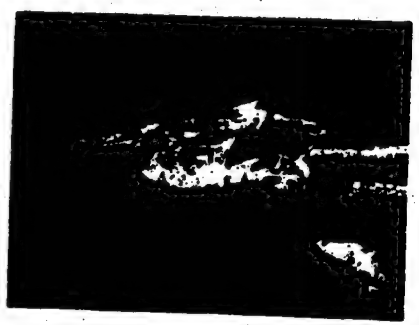


VAN NUYS
AIRFRAME FABRICATION

SUNNYVALE
COMPONENT ASSEMBLY



PALO ALTO
PROJECT MGMT. SYSTEM DESIGN
VEHICLE MOD. & CHECKOUT



SANTA CRUZ
HAZARDOUS TEST FACILITY

NOTE: BURBANK C-1 — COMPONENT MFG. & TEST

P565 SO 6/2/58
WD-58 09455

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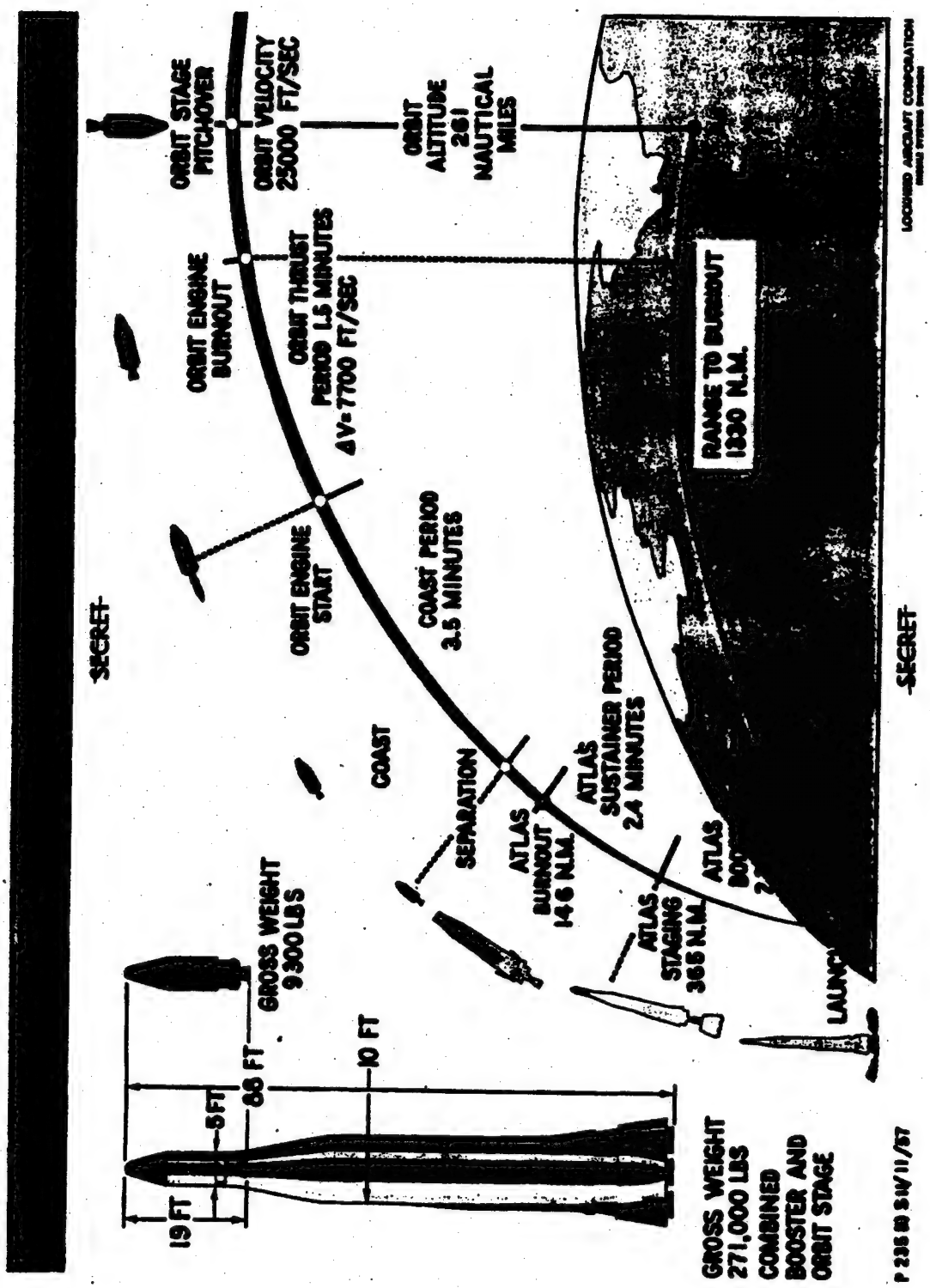
MISSILE SYSTEMS DIVISION



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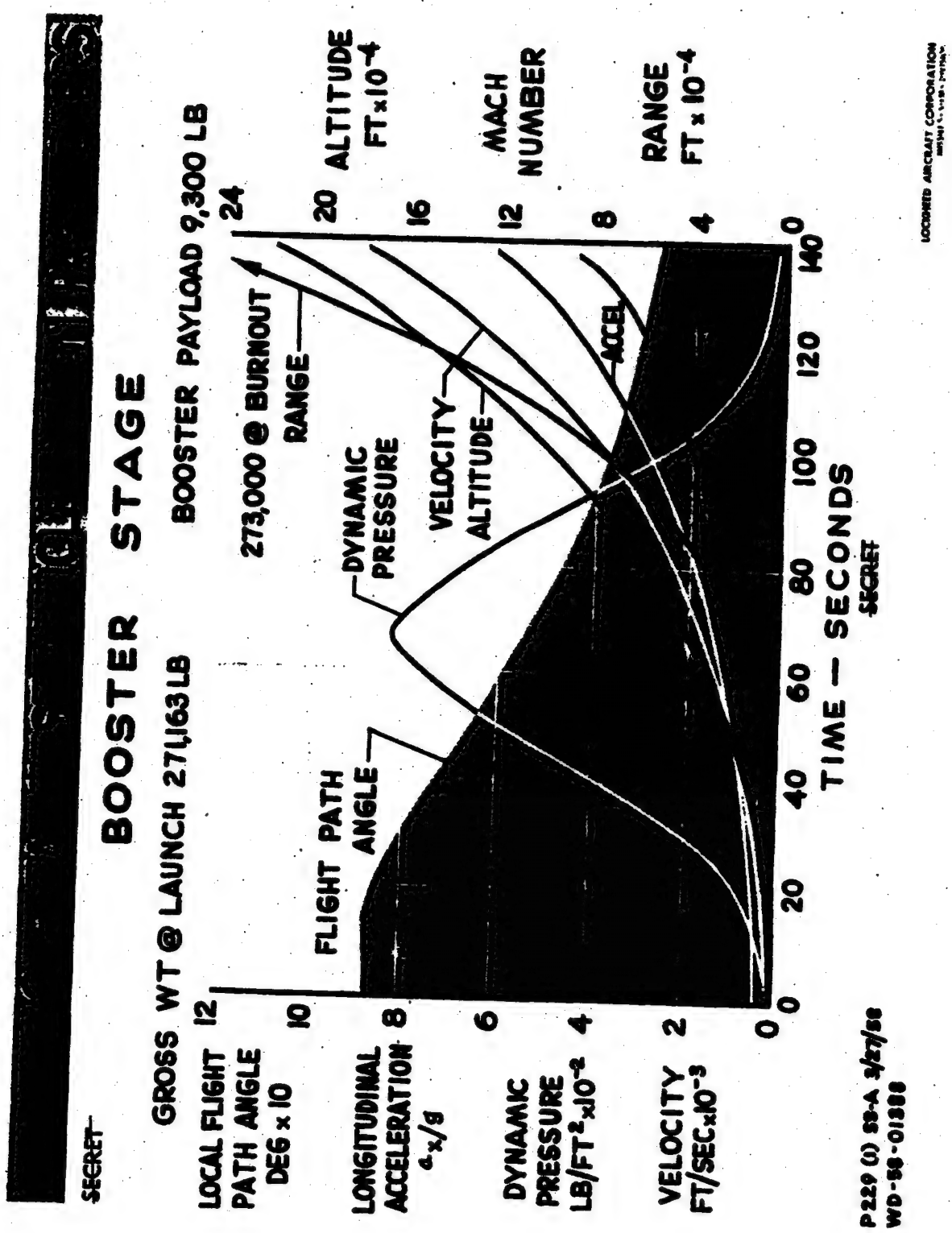

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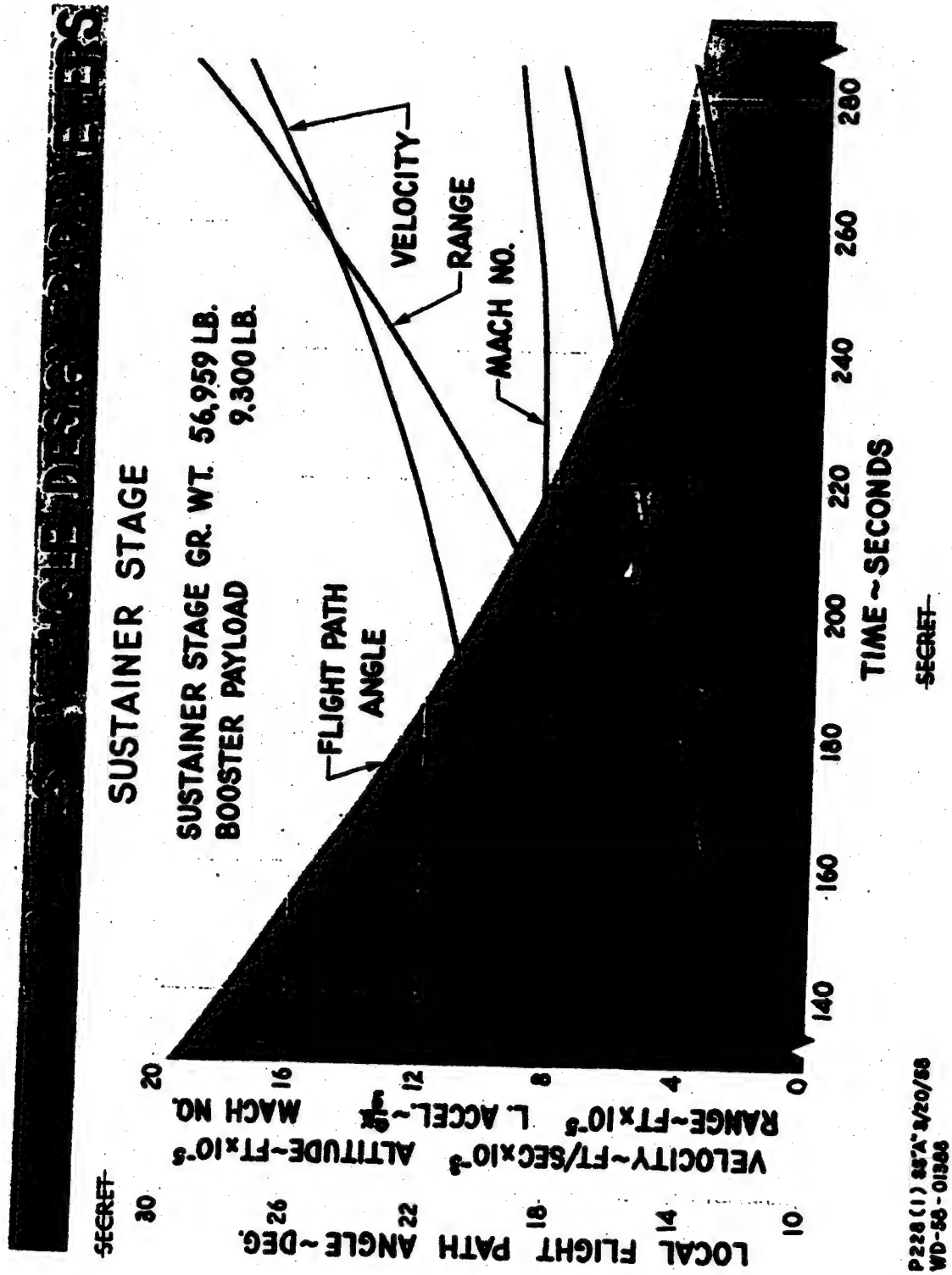

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WD-56-01386

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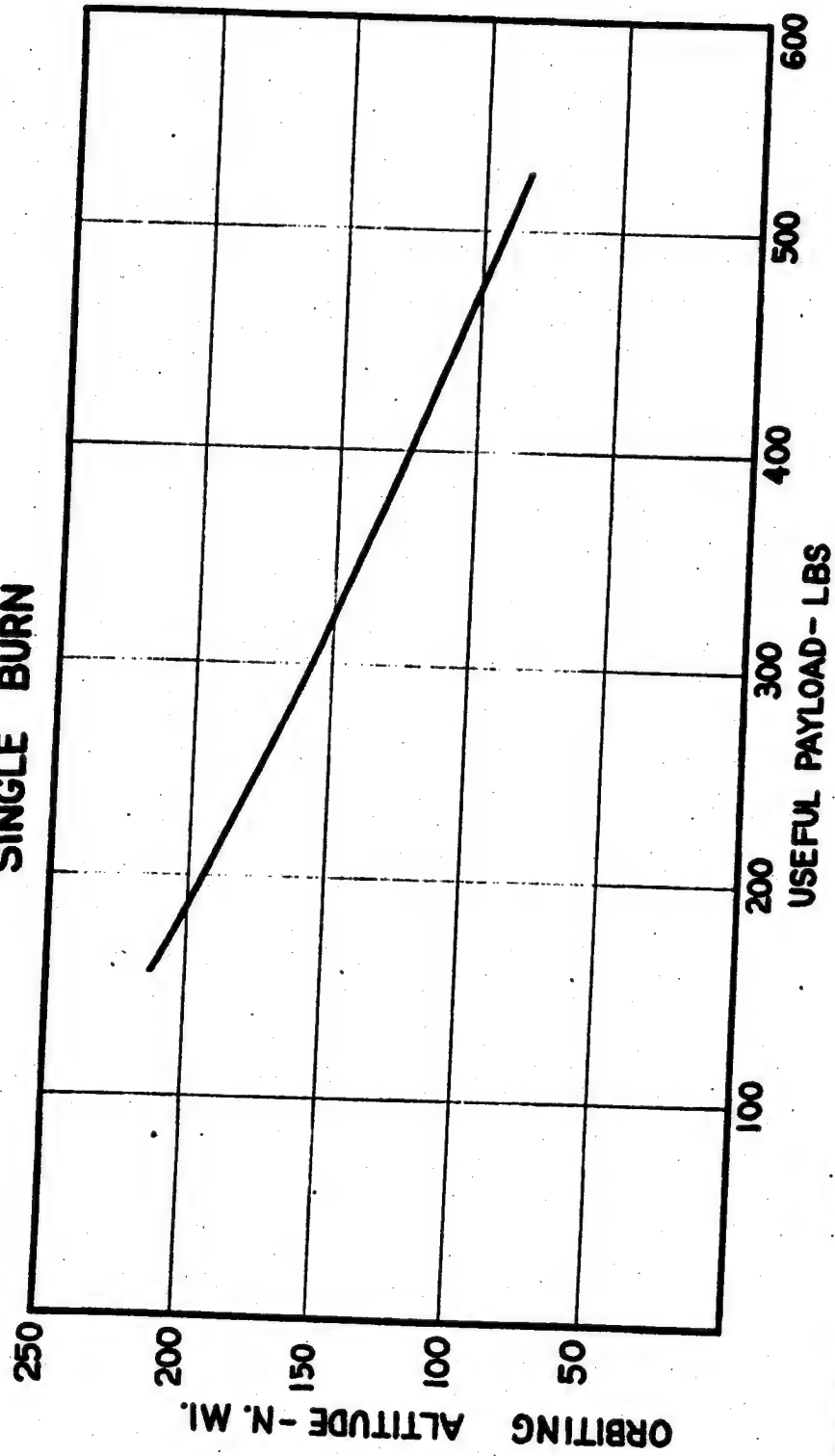
ALTITUDE VS. PAYLOAD-SENTRY/THOR

SINGLE BURN



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P 792
WD-58-06183

8/8/58

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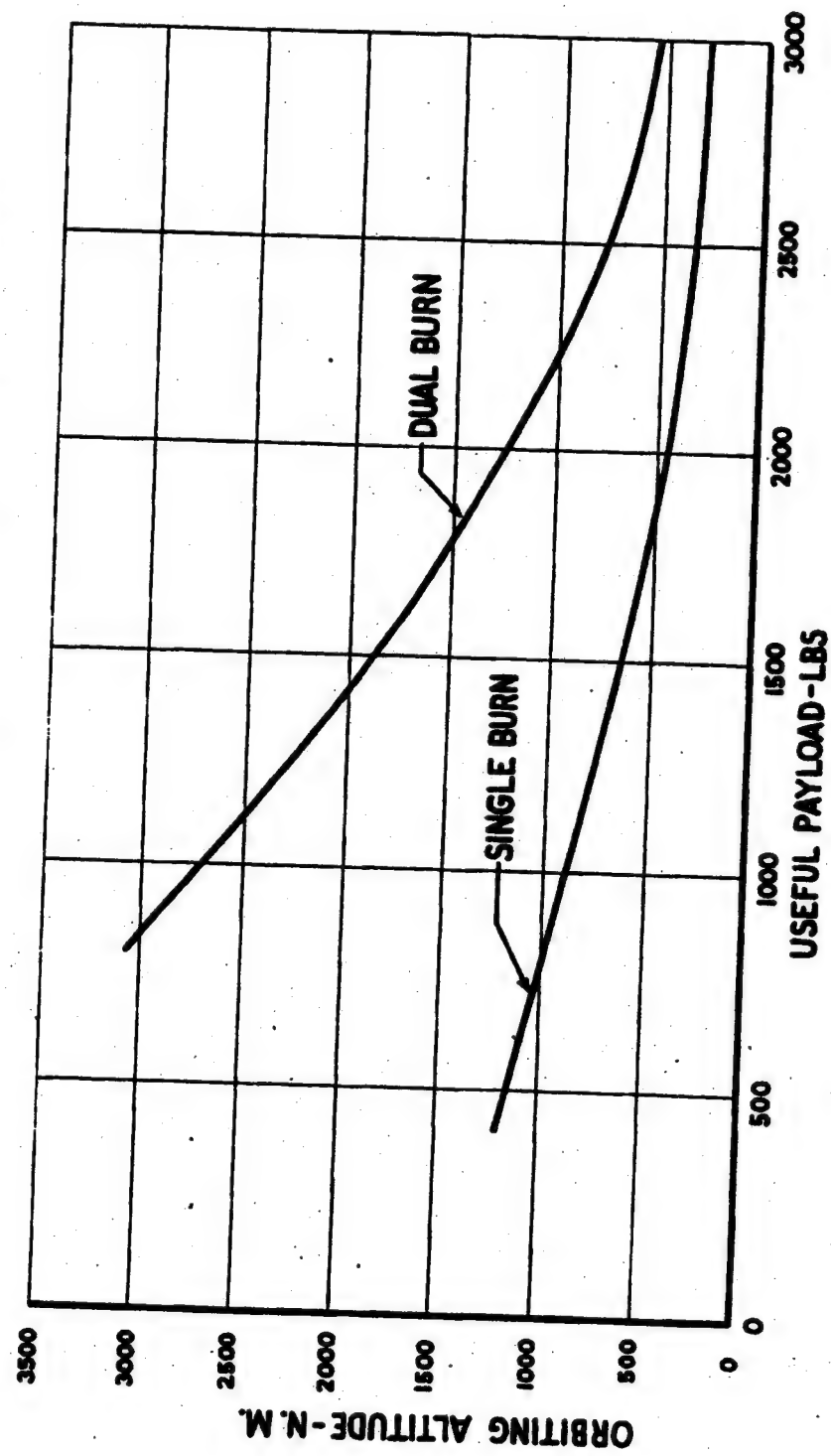
ALTITUDE VS PAYLOAD-SENTRY/ATLAS



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P 791
WD-58-05183

8/8/58

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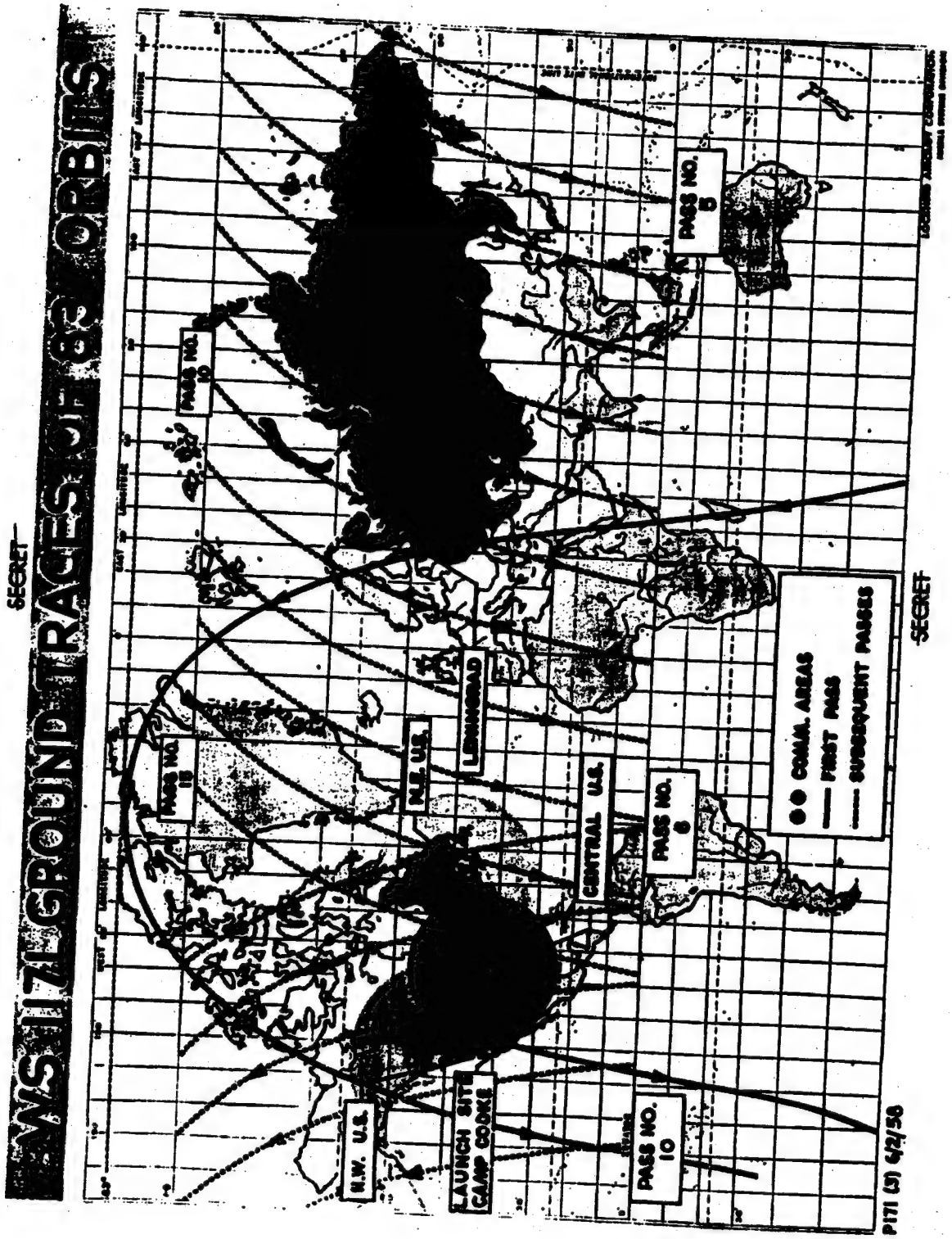

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VISUAL RECONNAISSANCE MODEL

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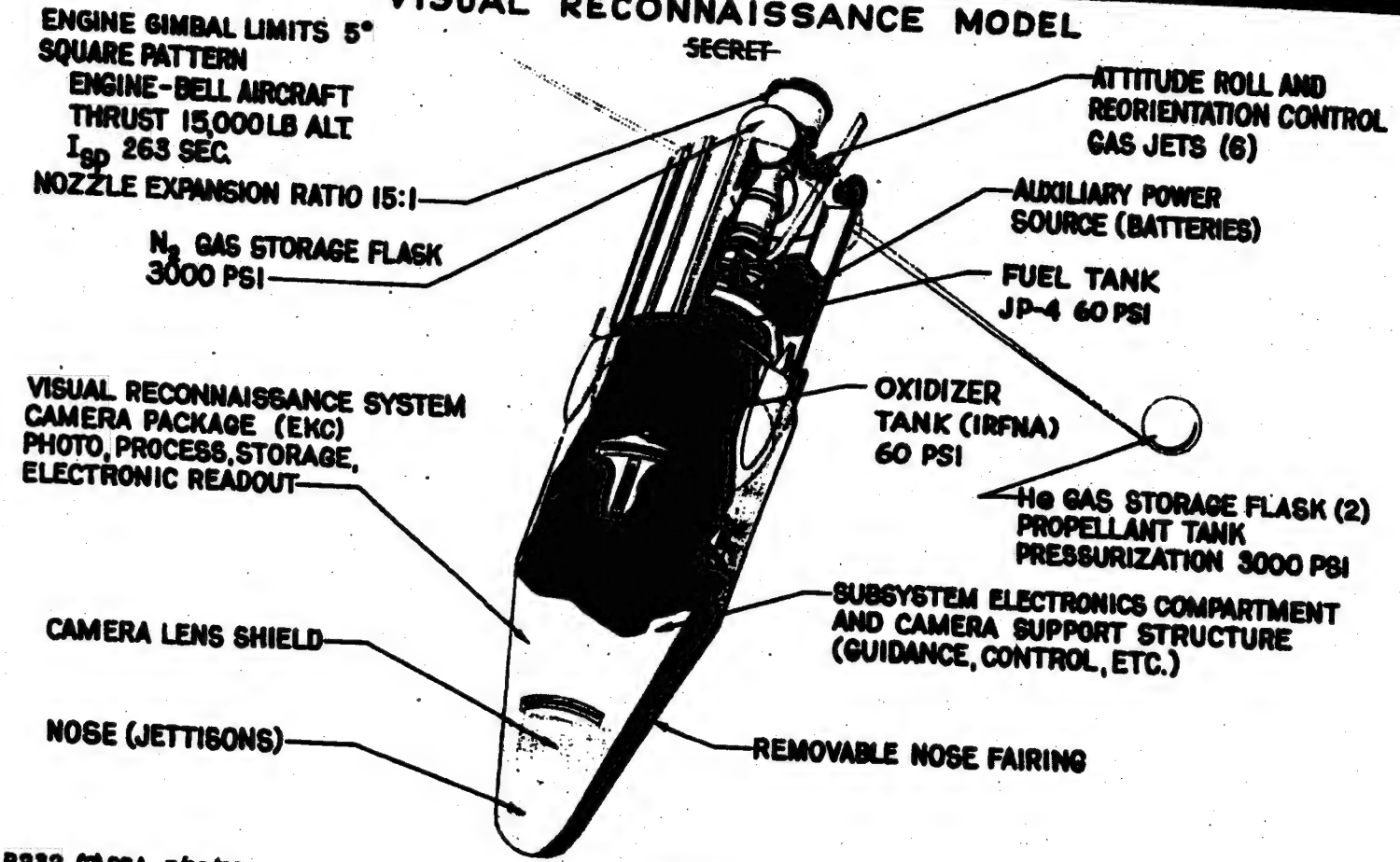

P232 (2) SGA 5/20/58
WD-58-00776

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MISSILE SYSTEMS DIVISION

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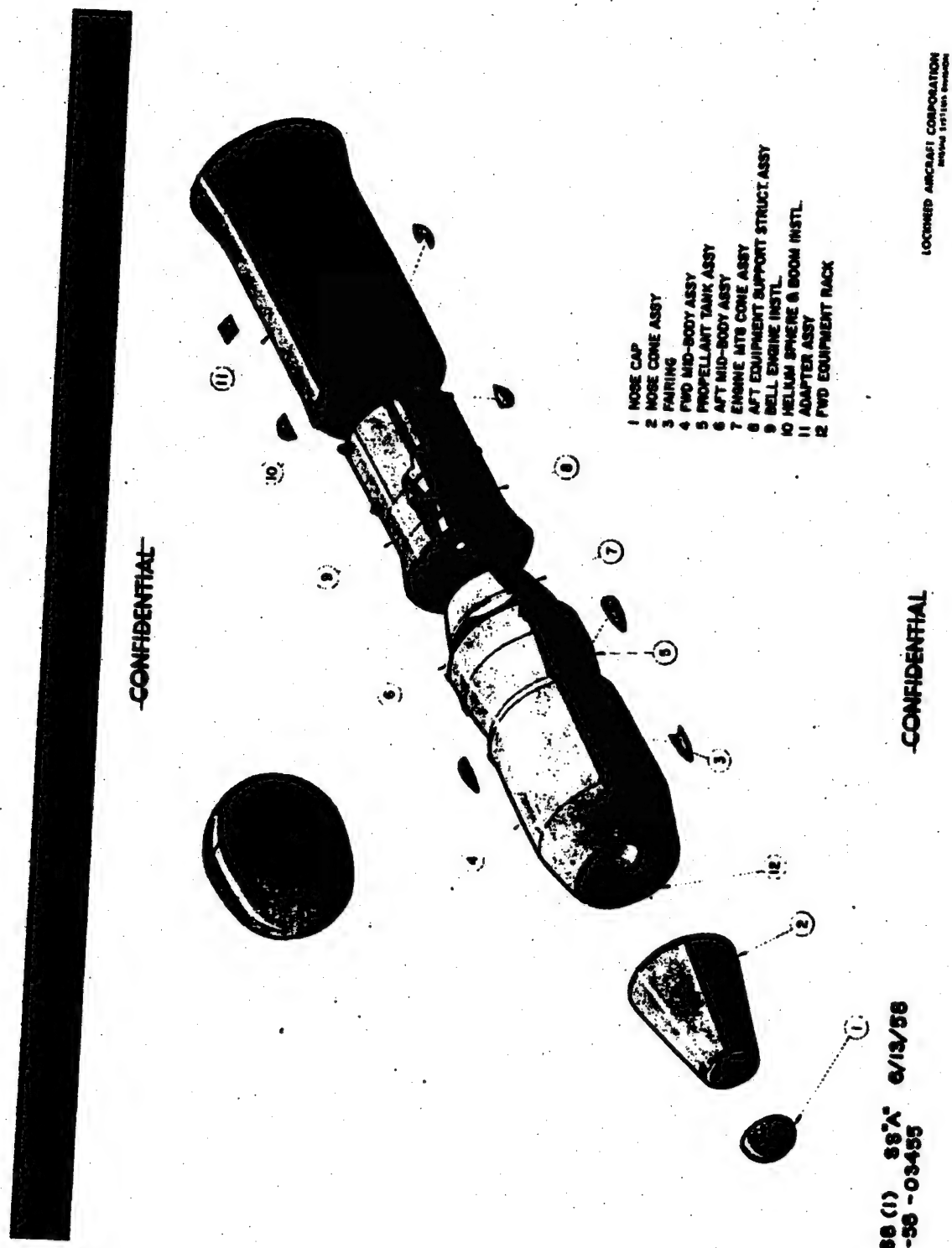

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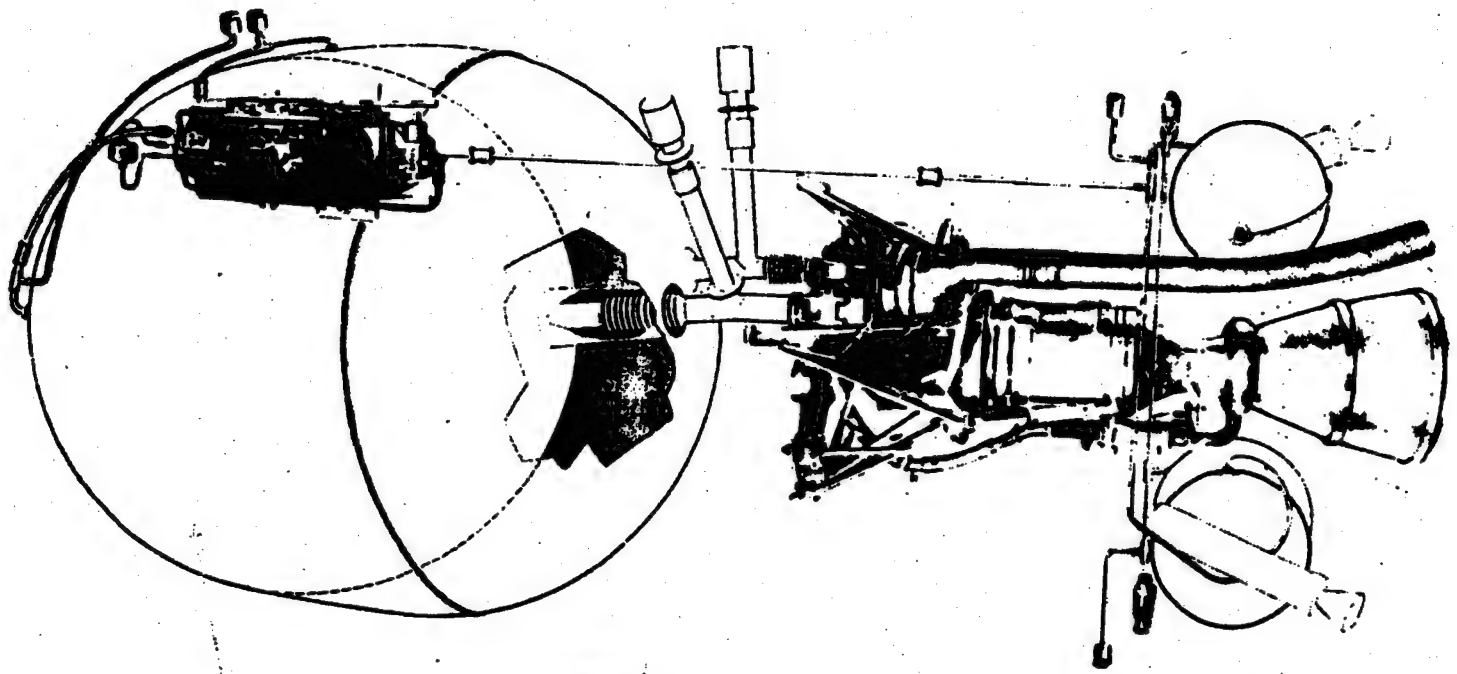


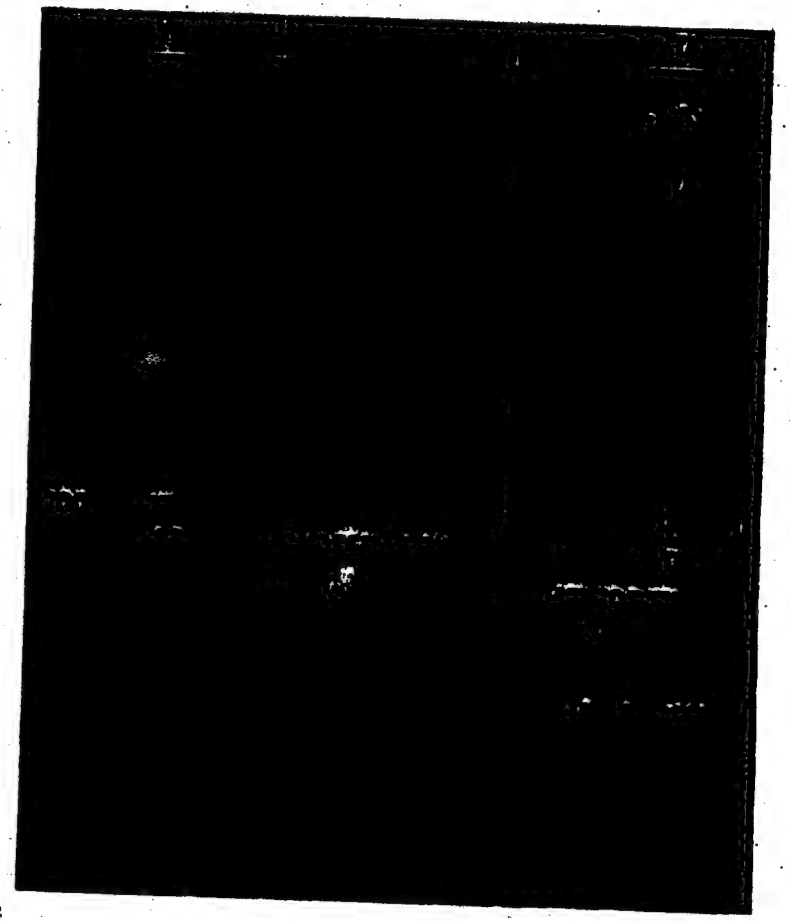
P422 (2) 55"B" 3/21/58
WD-58-01388

SENTRY AUXILIARY POWER SUPPLY

DEVELOPMENT PROGRAM

- CONVENTIONAL PRIMARY BATTERIES
  SILVER PEROXIDE
- HIGH ENERGY BATTERY
  HYDROGEN-OXYGEN
- SOLAR VOLTAIC CONVERTER
  SILICON BORON DIFFUSED p-n JUNCTION
- NUCLEAR THERMOMECHANICAL
  RADIOISOTOPE HEAT SOURCE

  REACTOR HEAT SOURCE



P 315 (2) SS "C" 3/13/58

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ADVANCED AUXILIARY POWER SYSTEMS

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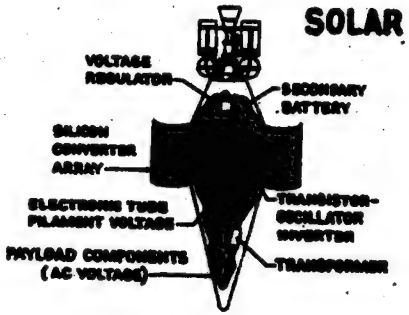
SOLAR



TWILIGHT ORBIT

CHARACTERISTICS

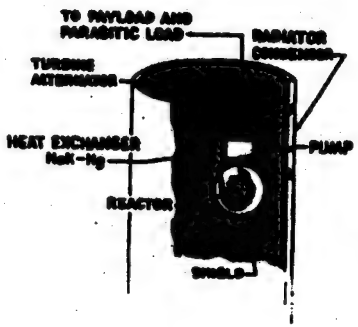
(a) ~10% CONVERSION EFFICIENCY (10-12 WATTS/FT^2)

(b) NICKEL CADMIUM SECONDARY BATTERY OF 10 WATT-HRS/LB ~2500 CYCLE LIFE

(c) POWER SYSTEM LIFE LIMITED BY BATTERY AND/OR METEORIC EROSION

(d) TWILIGHT ORBIT ADVANTAGES: CONSTANT IRRADIATION AT NORMAL INCIDENCE, NO HELIOTROPE, COOLER CELLS (BACKSIDE RADIATION), HIGHER EFFICIENCY

NUCLEAR REACTOR



CHARACTERISTICS

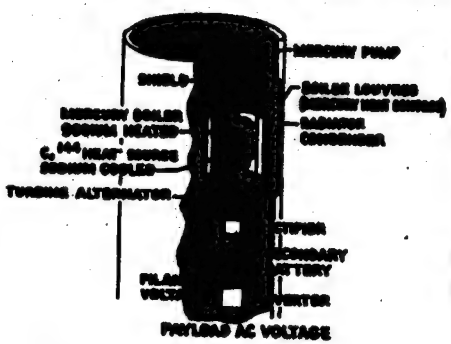
(a) 3KW CONTINUOUSLY

(b) LONG DURATION (~1 YEAR)

(c) SHIELDING REQUIRED (OR SEPARATION)

(d) PAYLOAD COMPATABILITY PROBLEMS

ISOTOPE



CHARACTERISTICS

(a) 500 WATTS AT 60 DAYS

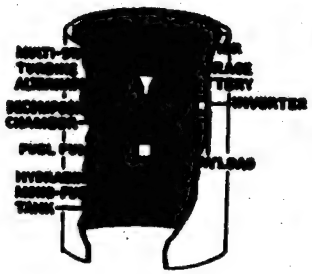
(b) 250 WATTS AT 340 DAYS

(c) TUBE FILAMENTS PROVIDE PARASITIC RESISTIVE LOAD FOR EXCESS POWER IN EARLY VEHICLE LIFE DURING COAST PERIODS

(d) SHIELDING REQUIRED

(e) TOTAL WEIGHT WITH SHIELD 700-800 POUNDS

CHEMICAL (POWER SOURCE)



CHARACTERISTICS

(a) LIFE LIMITED BY MONOFUEL SUPPLY

(b) EXHAUST PRODUCTS USEFUL FOR ORBIT ECCENTRICITY CONTROL

(c) POWER LEVEL EASILY CONTROLLABLE

P162 4/8/57

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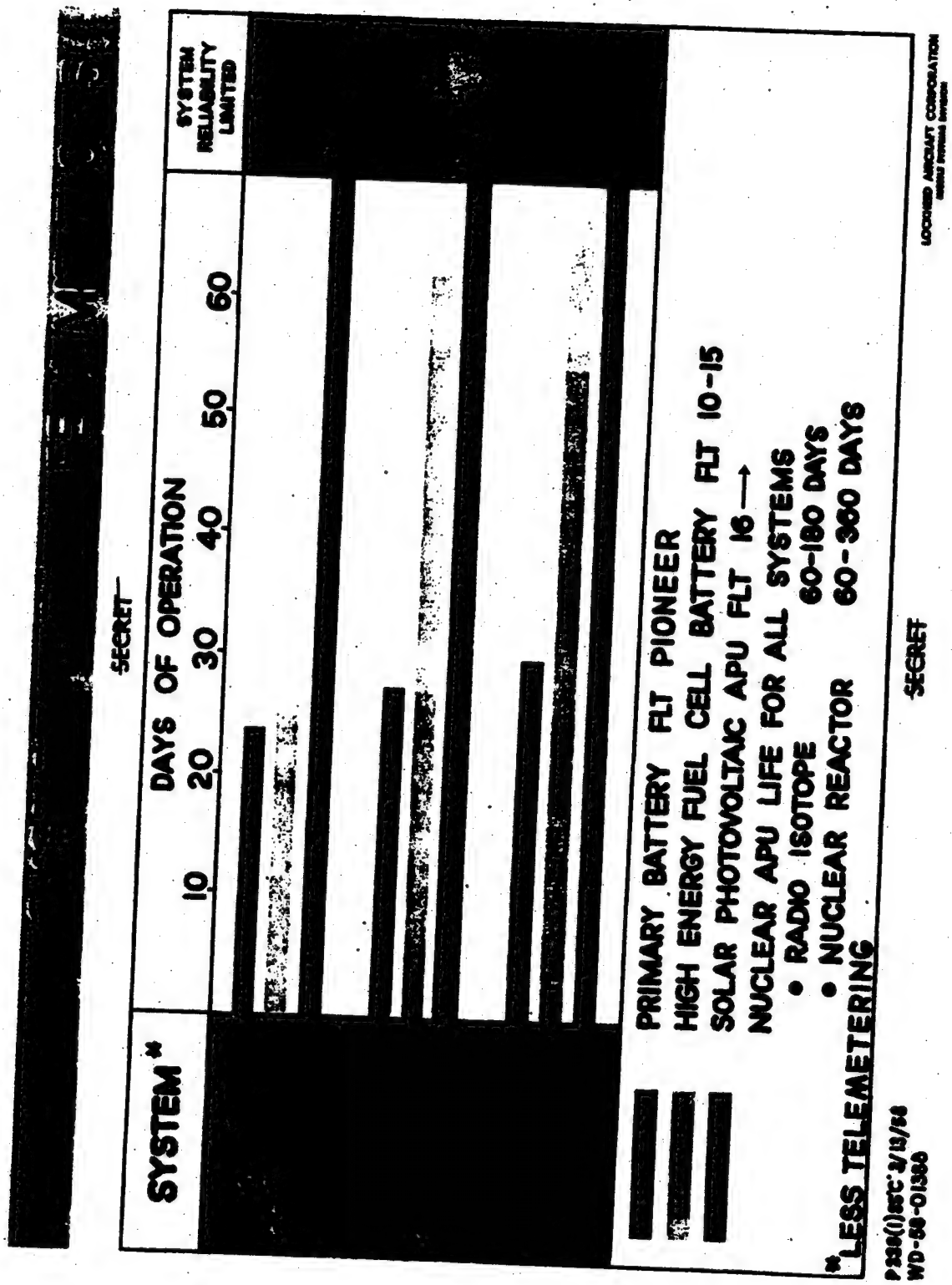

P 330(1)SC 2/13/56
WD-56-01386

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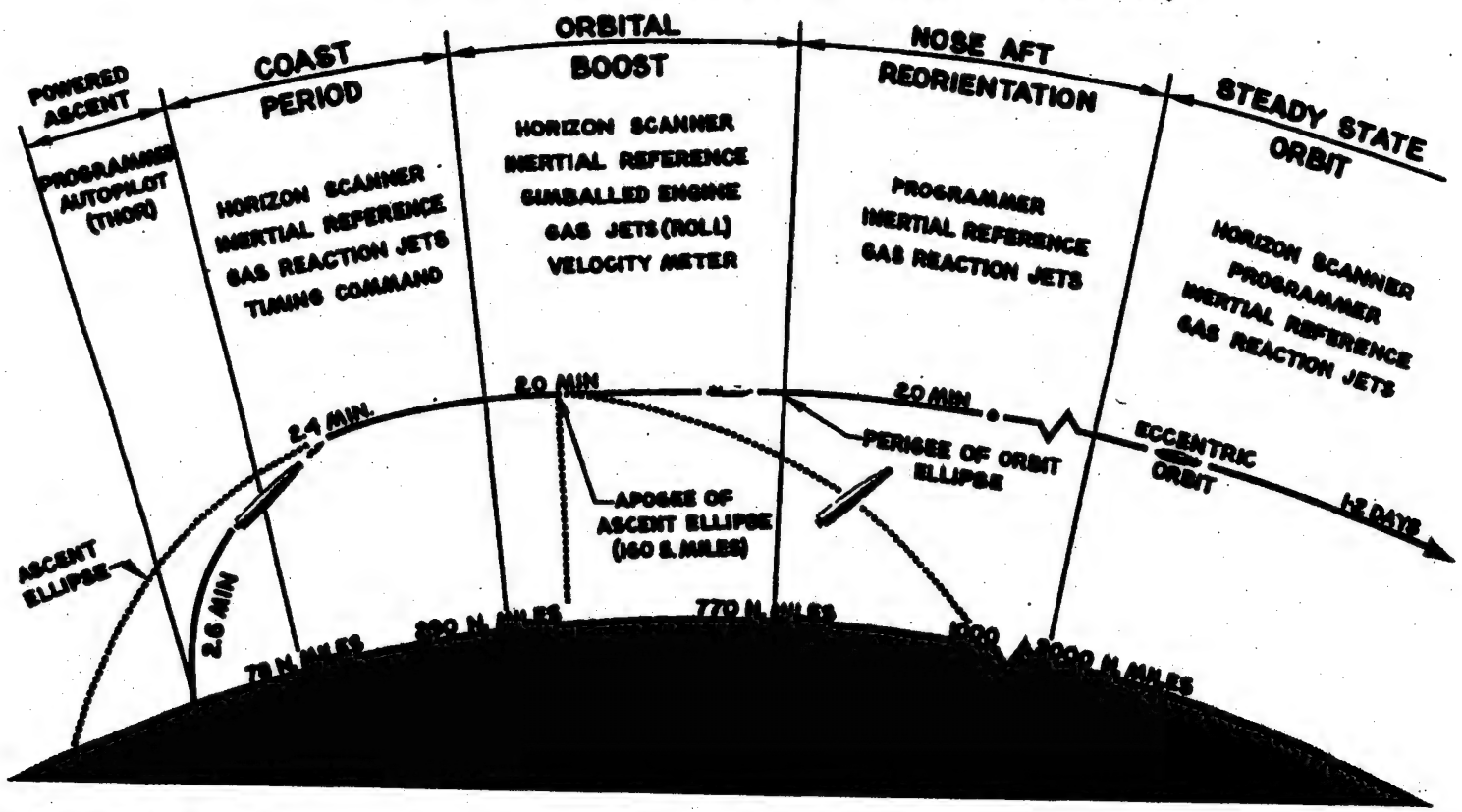
GUIDANCE & CONTROL SYSTEM

TYPICAL SENTRY ASCENT (THOR-PROG IIA)



P763 SS"D" 8/4/58
WD-58-05183

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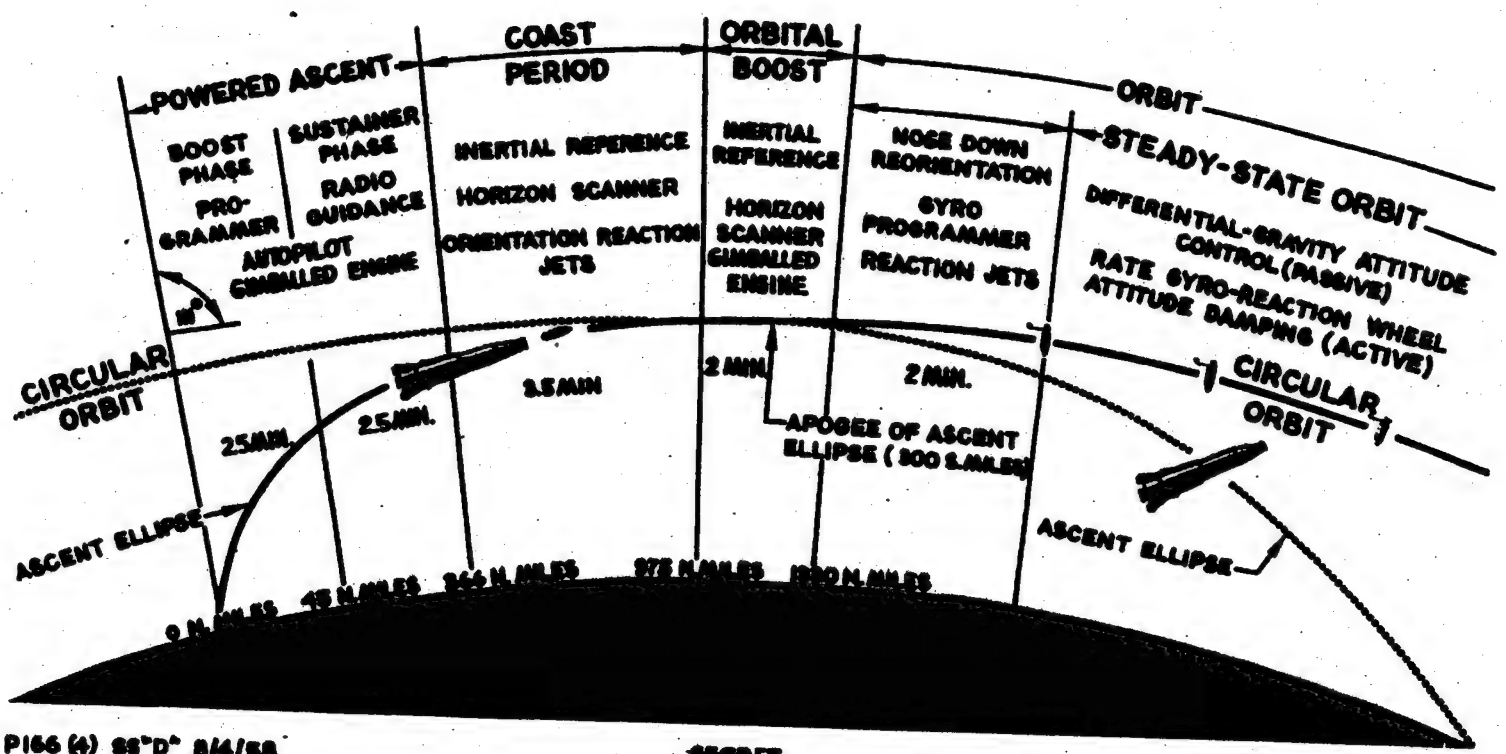
GUIDANCE & CONTROL SYSTEM

TYPICAL SENTRY ASCENT (ATLAS-PROG. I)



P166 (4) SS"D" 8/4/58
WD-58-05183

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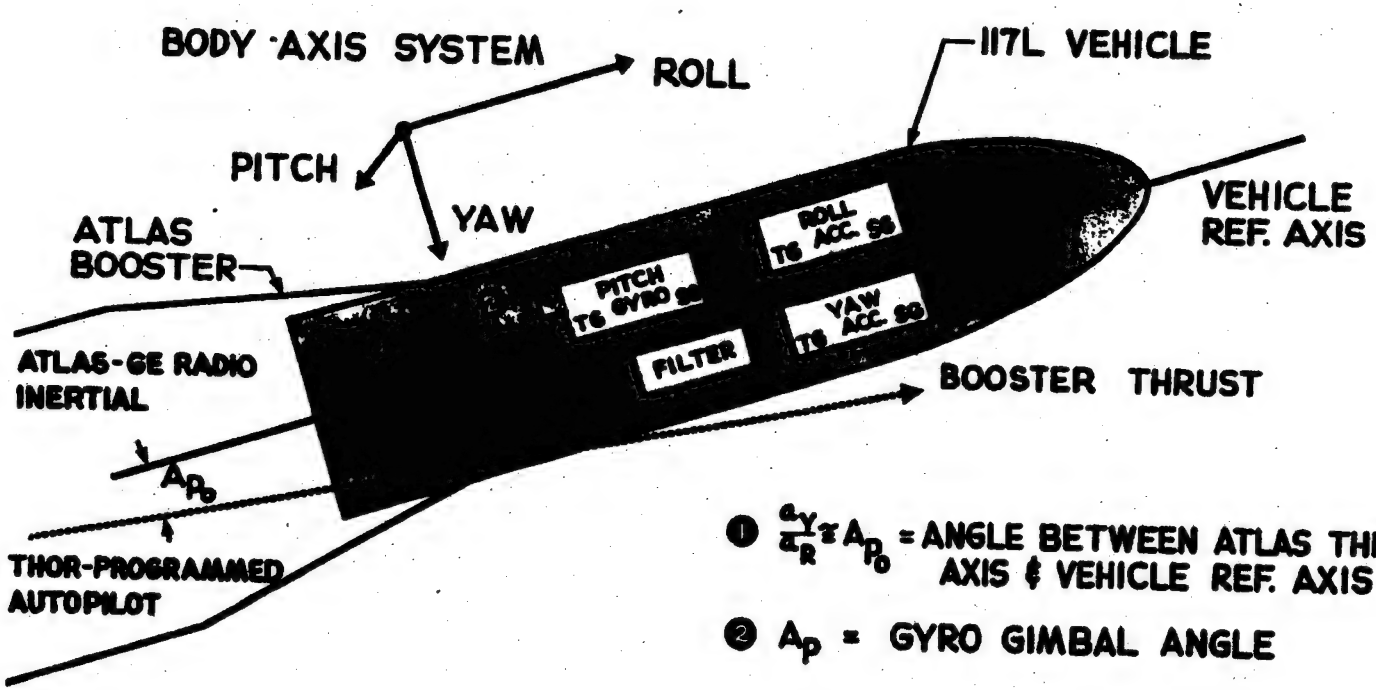
SENTRY ASCENT BOOST PHASE

GUIDANCE & CONTROL FUNCTIONING COMPONENTS



❶ $\frac{a_Y}{a_R} \cong A_{P_0}$ = ANGLE BETWEEN ATLAS THRUST AXIS & VEHICLE REF. AXIS

❷ A_P = GYRO GIMBAL ANGLE

P-707 (1) 55"D" 3/22/56
WS-55-04445

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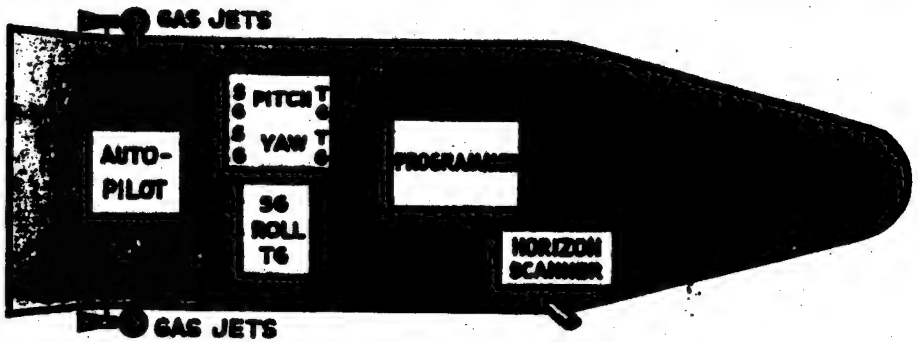
SENTRY COAST PHASE

GUIDANCE & CONTROL FUNCTIONING COMPONENTS



1. HORIZON SCANNER ROLL ERROR SIGNAL
2. YAW ANGLE RESET
3. HORIZON SCANNER PITCH ERROR SIGNAL
4. PROGRAM PITCH RATE

PROGRAMMER COMMANDS GYRO PACKAGE REF. ATTITUDE, GAS JETS VIA AUTOPILOT ALIGN VEHICLE ATTITUDE TO GYRO REF. ATTITUDE.

P-708 (1) SS "D" 7/22/58
WD- 58- 04445

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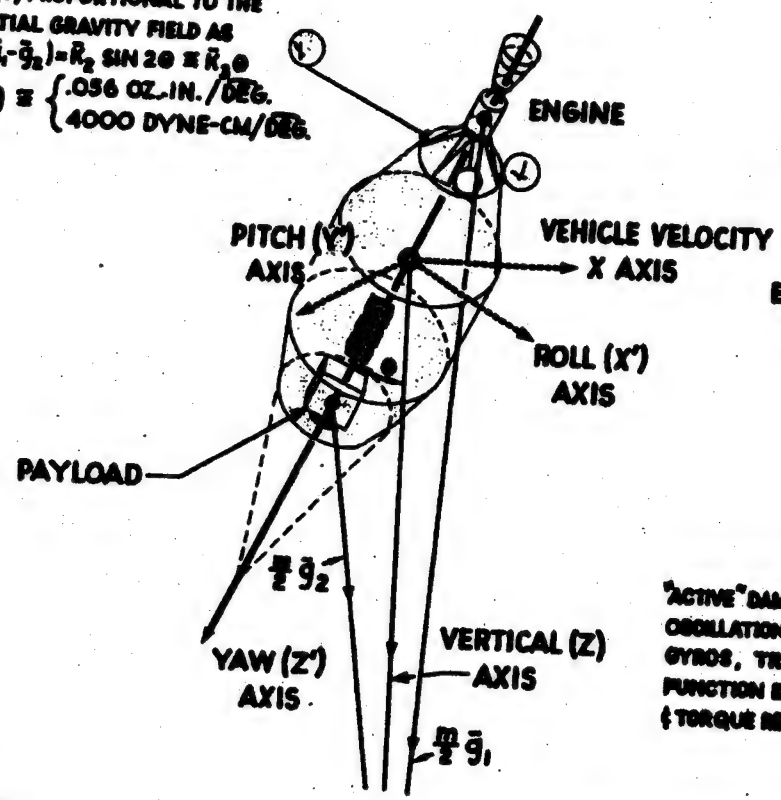
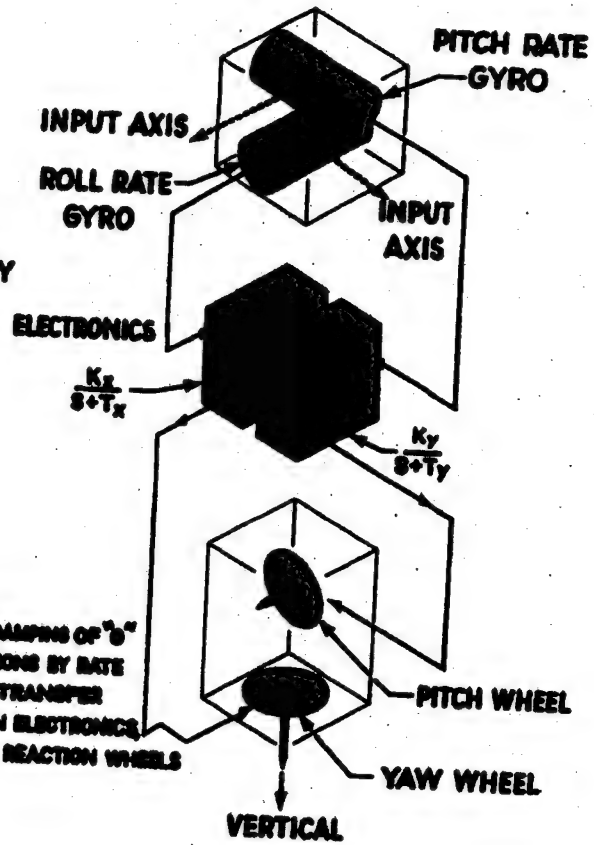
(PITCH CASE-TYPICAL)

"PASSIVE" GRAVITATIONAL RESTORING TORQUE (T) PROPORTIONAL TO THE DIFFERENTIAL GRAVITY FIELD AS

$\bar{T} = \bar{R}_1 \times (\bar{g}_1 - \bar{g}_2) = \bar{R}_2 \sin 2\theta \cong \bar{R}_3 \theta$

$K_3(\text{PITCH}) \cong \begin{cases} .056 \text{ OZ.-IN./DEG.} \\ 4000 \text{ DYNE-CM/DEG.} \end{cases}$





"ACTIVE" DAMPING OF "θ" OSCILLATIONS BY RATE GYROS, TRANSFER FUNCTION ELECTRONICS & TORQUE REACTION WHEELS

P164(I)4/8/57
WD-58-01556

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MISSILE SYSTEMS DIVISION

WS117L SENTRY VEHICLE WEIGHT

		PROGRAM IIA(1) LBS.	PROGRAM I(2) LBS.
VEHICLE PAYLOAD	(INCLUDES PRIMARY PAYLOAD & A.R.S. TELEMETRY, & COMMUNICATIONS)	573	3197
STRUCTURE GROUP	(INCLUDES AIRFRAME & EQUIPMENT SUPT. STRUCTURE)	402	554
PROPULSION GROUP	(INCLUDES ENGINE, PROPELLANT TANKS, PRESS. SYSTEM & ULLAGE ROCKETS)	593	593
CONTROLS GROUP	(INCLUDES ASCENT & ORBITAL CONTROLS)	160	123
GUIDANCE GROUP	(INCLUDES ASCENT & ORBITAL GUIDANCE)	100	140
VEHICLE WEIGHT EMPTY		1828	4607
PROPELLANTS		6624	4693
BOOSTER PAYLOAD		8452	9300
VEHICLE WEIGHT ON ORBIT		1776	4466

(1) UDMH-IRFNA ENGINE & LAUNCHED FROM CAMP COOKE-THOR BOOSTED NOM. CIRCULAR ORBIT ALTITUDE = 160 STATUTE MILES

(2) UDMH-IRFNA ENGINE & LAUNCHED FROM AFMTC - ATLAS BOOSTED NOM. CIRCULAR ORBIT ALTITUDE = 300 STATUTE MILES

P262 (3) S 7/17/58
WD-58-04445

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TECHNICAL SUMMARY

	PIONEER	ADVANCED
FOCAL LENGTH	6"	36"
LENS SPEED	f 2.8	f 2.8
DURATION	9 DAYS	30 DAYS
STRIP ON GROUND - WIDTH	100 MI.	17 MI.
STRIP ON GROUND - LENGTH	2000 MI. AVG.	360 MI. INTERMITTENT
AREA COVERED	1.07×10^7 SQ. MI.	9.9×10^5 SQ. MI.
CAMERA WT.	300 LB.	400 LB. (EST.)
INCLUDES FILM & PROCESSOR	3.4 LB.	11.4 LB.

	PIONEER	ADVANCED
ELECTRICAL POWER REQUIREMENTS		
PEAK	300 WATTS	300 WATTS
AVERAGE	660 WATT HR/DAY	660 WATT HR/DAY
SCALE ON VEHICLE FILM	1:3,168,000	1:528,000
RESOLUTION ON GROUND AT LOW (2:1) CONTRAST	100 FT.	20 FT.

FILM USED: MICROFILE EASTMAN F5740-6

FILM RESOLUTION: 250 ℓ/mm HIGH CONTRAST

> 100 ℓ/mm LOW CONTRAST

GROUND ENLARGEMENT 53:1 FOR USE

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WS117L FERRET SUBSYSTEM-PROJECT STRUCTURE

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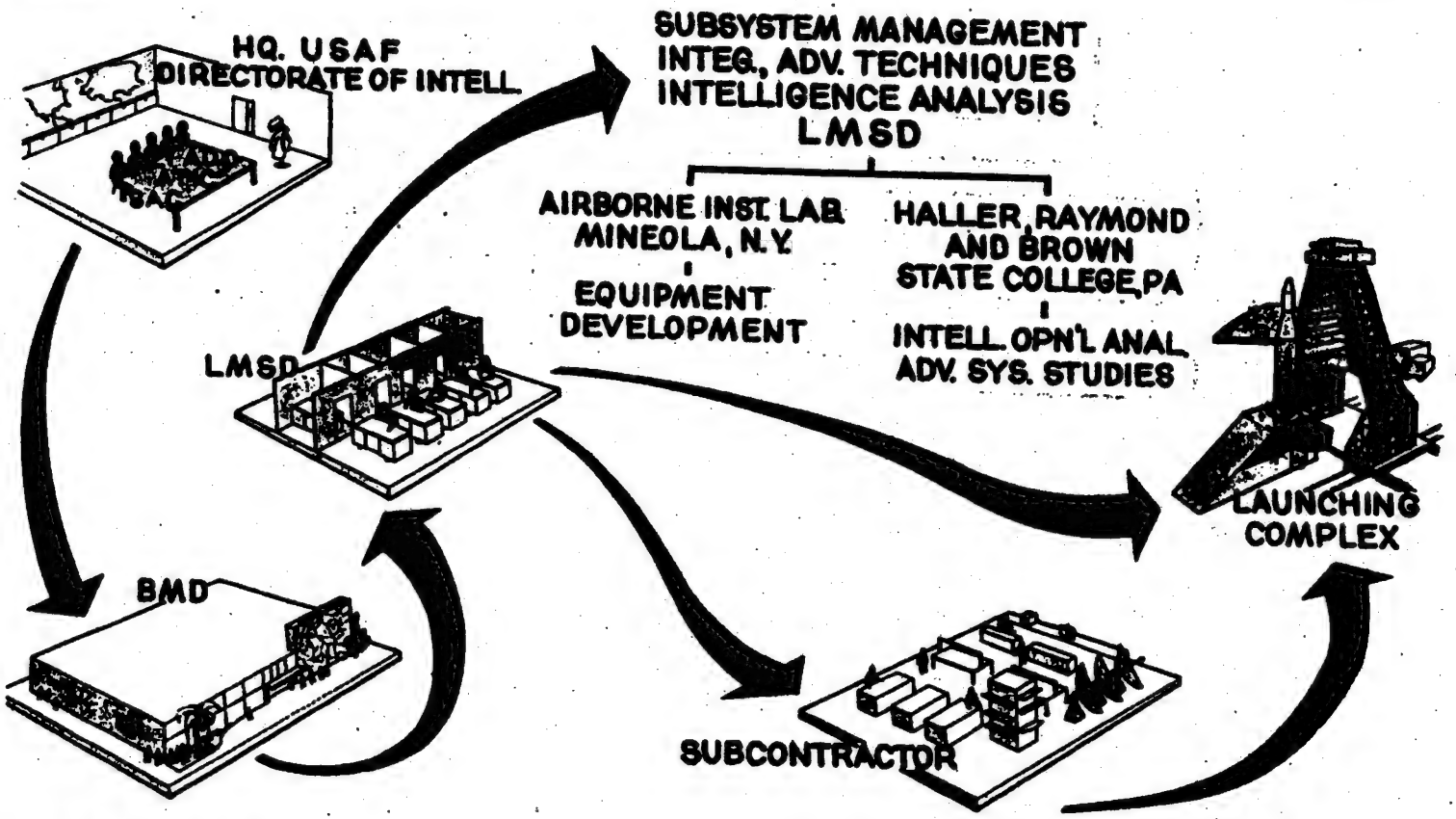

P175 (4) 6/30/58 35"F"
WD-58-03455

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AIRBORNE RECEPTION

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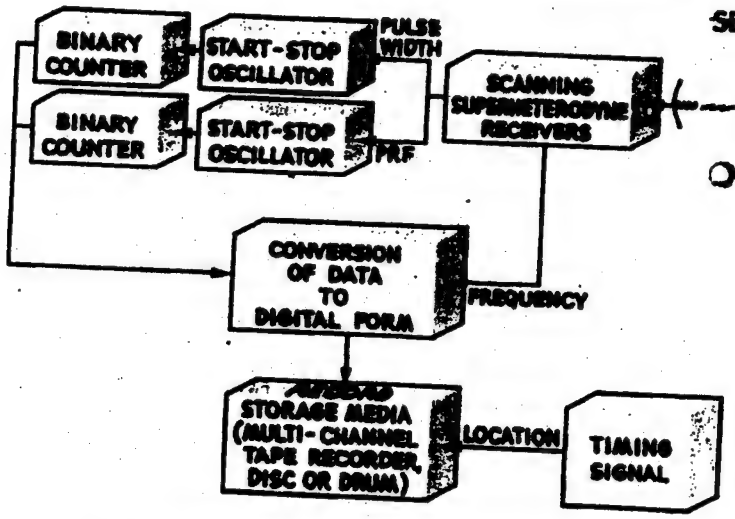

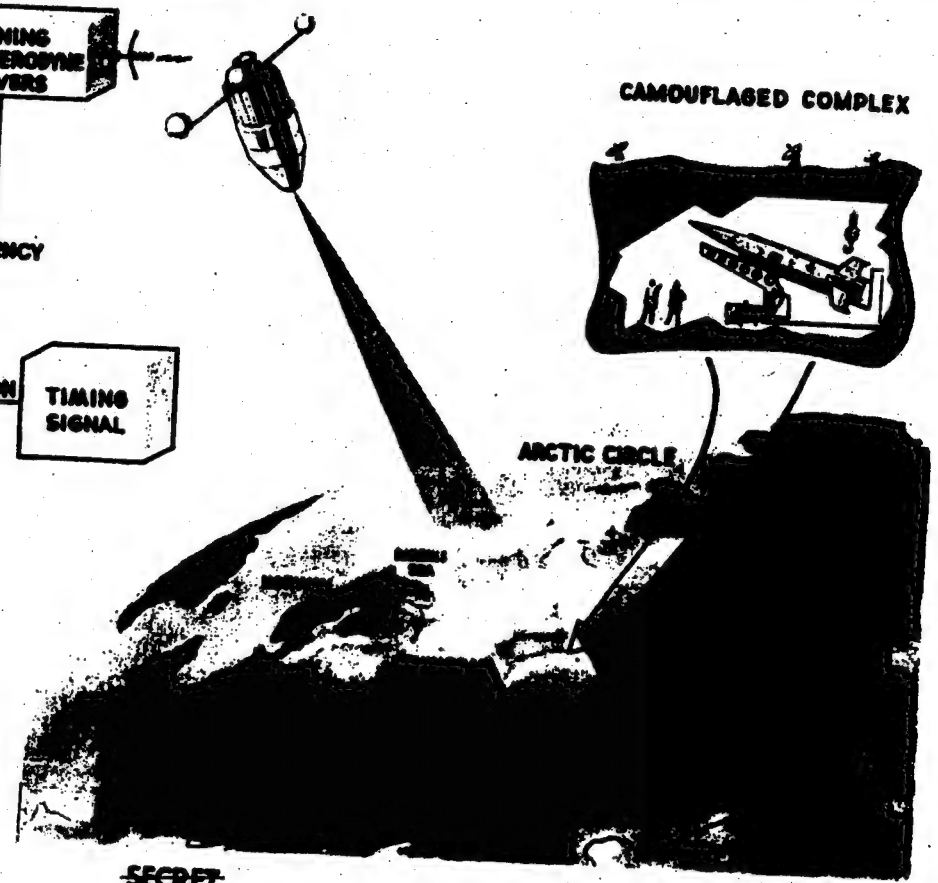

PRIORITY BANDS

1. 2,500-3,200 MC/SEC
2. 9,000-10,000 MC/SEC
3. (a) 59-100 MC/SEC
   (b) 100-200 MC/SEC
   (c) 200-400 MC/SEC
   (d) 400-650 MC/SEC

MONITORING OF ALL BANDS IN THE 50-10000 MC/SEC SPECTRUM

P182(3) SSF 1/22/58
WD-58 00001

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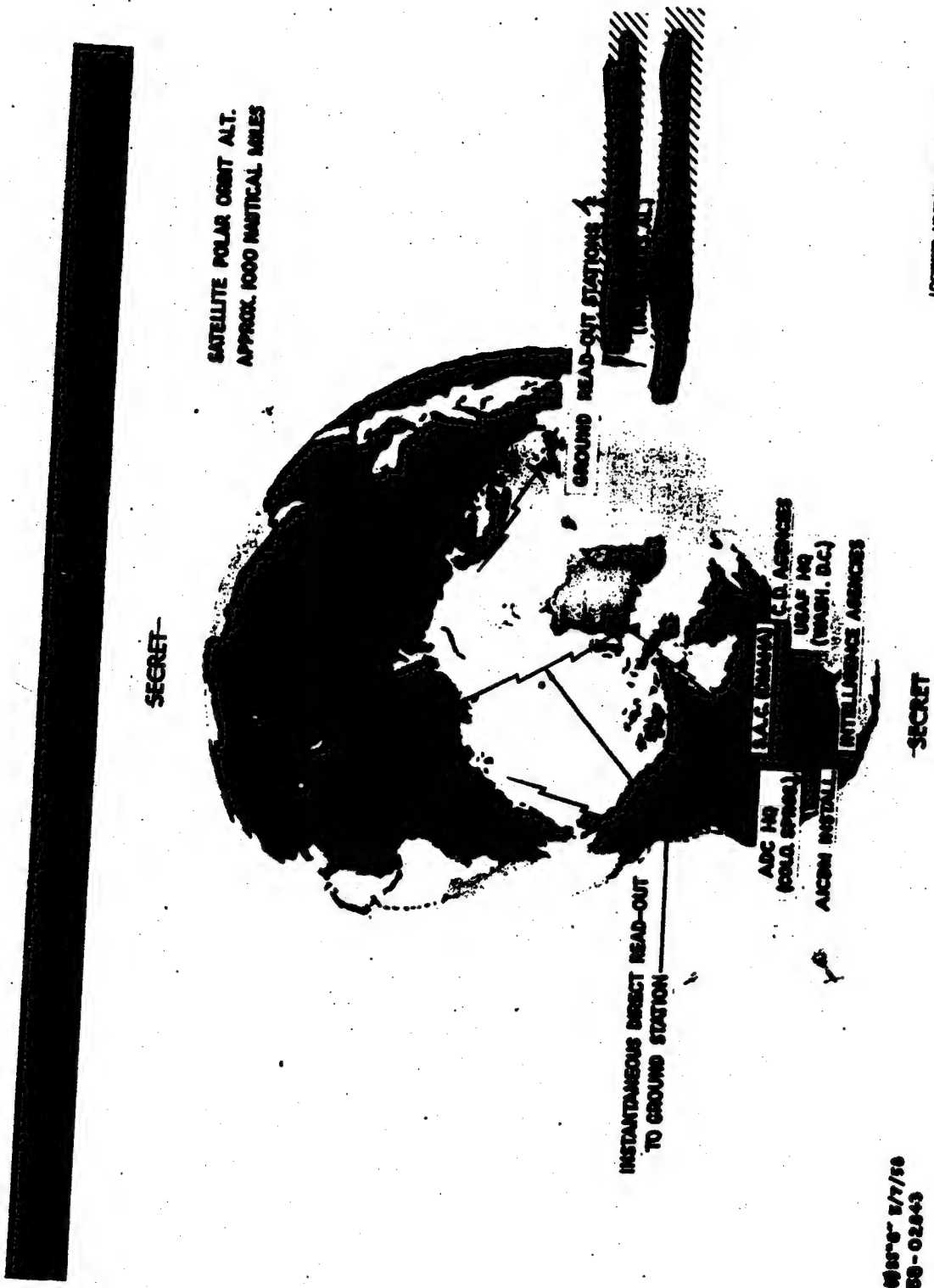

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SATELLITE POWER REQM'TS VS. SUPPLY

POWER REQUIREMENTS

UNIT	WATT HR/DAY
TRANSMITTER	171
RECEIVER	117
DECODER	176
TIMER & PROGRAMMER	120
SUBSYSTEM "6"	180
ATTITUDE DAMPING SYST.	240
YAW STAB. GYRO WHEEL	96
TOTAL REQM'T	1100

SOLAR POWER SUPPLY

UNIT	WATT HR/DAY
SOLAR CELL OUTPUT	3796
LOSS: DEGRADATION, CONVERSION STORAGE, REGULATION OTHER	2548
TOTAL USEFUL POWER FOR EQUIP.	1248

- 80 FT^2 SOLAR CELLS REQUIRED AT 1000 N. MI. ALTITUDE ON NOON ORBIT
- OVERALL PERFORMANCE FACTOR - 33%

ICBM ATTACK ALARM SYSTEM

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VEHICLE PAYLOAD

EQUIPMENT	DESCRIPTION
INFRARED	BOUWERS CONCENTRIC OPTICAL SYSTEM 7-INCH APERTURE; 1.3 APERTURE RATIO UNCOOLED LEAD-SULPHIDE DETECTORS MODULATING RETICLE MOUNTED ON ROTATING SCANNER FRAME TRANSISTORIZED INFRARED SIGNAL AMPLIFIERS
COMMUNICATIONS	TRANSMITTER & MODULATORS COMMAND RECEIVER DECODER TIMER/PROGRAMMER 4 QUADRANT RECEIVING ANTENNAS TRANSMITTER ANTENNA
AUX. POWER	SOLAR ENERGY COLLECTOR CELLS 400 CYCLE INVERTER 2000 CYCLE INVERTER 28V DC REGULATOR NICKEL-CADMIUM BATTERY

P620 (1) SS'6" 8/4/58
WD-58-03455

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PROPOSED ICBM ATTACK ALARM SYSTEM

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OPERATIONAL GROUND BASE REQUIREMENTS

1. LAUNCH SITE-COOKE AIR FORCE BASE

- LAUNCH PADS — THREE
- GRND. SUPP. EQUIP. — THREE SETS
- ASSEMBLY HANGARS — ONE

2. TRACKING STATIONS-NORTHEAST, NORTHWEST, & SOUTH CENTRAL

- SAME UHF INSTALLATIONS AS PROGRAMS I, II, & III (IF VHF IS UTILIZED, ADDITIONAL EQUIPMENT REQUIRED)

3. READ OUT STATIONS [redacted] FAIRBANKS, AL [redacted]

- THREE 60 FT. TRACKING ANTENNAS FOR IR DATA & TELEMETRY RECEPTION.
- THREE DATA LINK & THREE TELEMETRY RECEIVERS.
- TWO DIRECTION FINDERS & TWO COMMAND TRANSMITTERS WITH ANTENNAS.
- THREE SETS OF DISPLAY CONSOLES & CONTROL CONSOLES.
- MASTER CONTROL CONSOLE, DATA RECEIVERS, ORBIT TRACKING PROGRAMMER.

P6IT(2) 35"6" 6/4/58
WD-58-034-55

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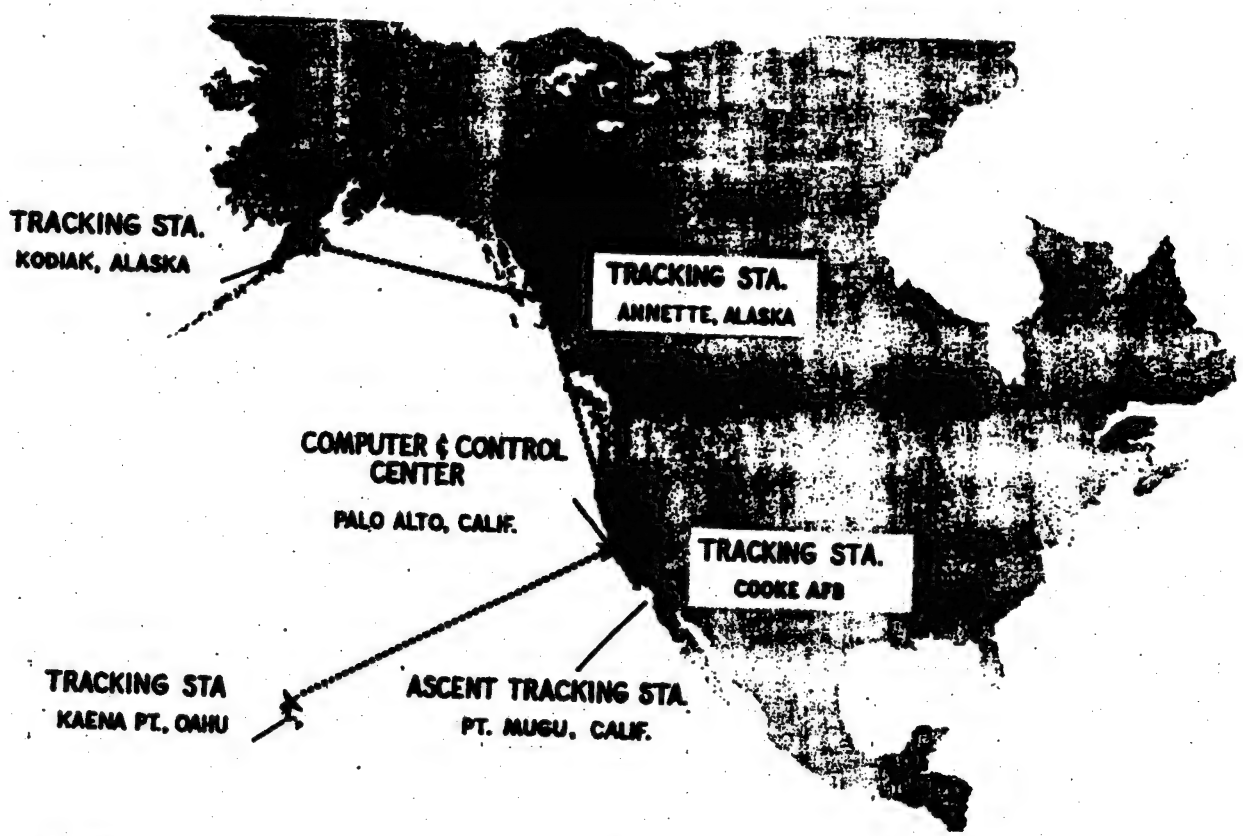
STATION LOCATIONS (THOR)



P 009 (2) SS "H" 7/8/58
WP-58-01145

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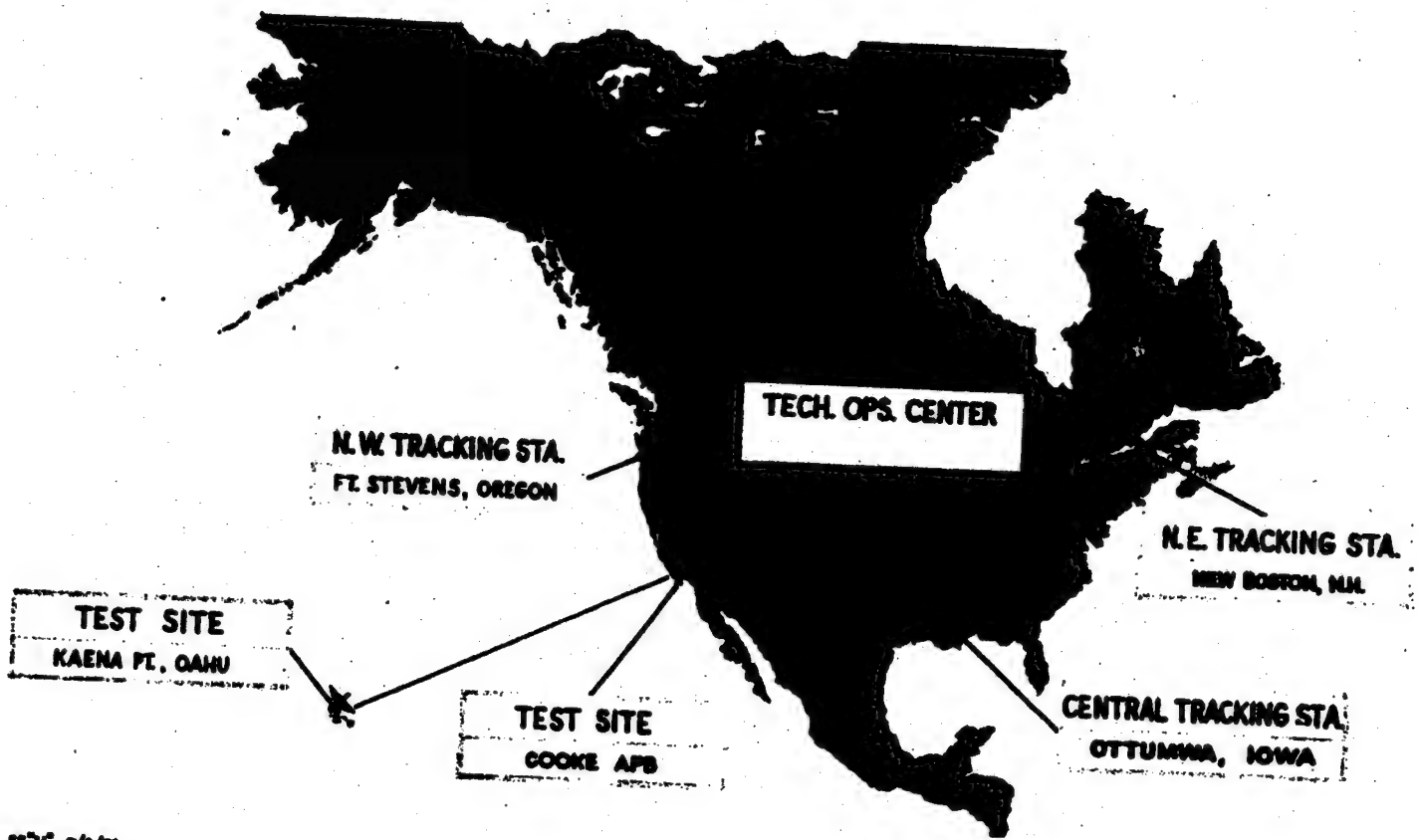
STATION LOCATIONS (ATLAS)



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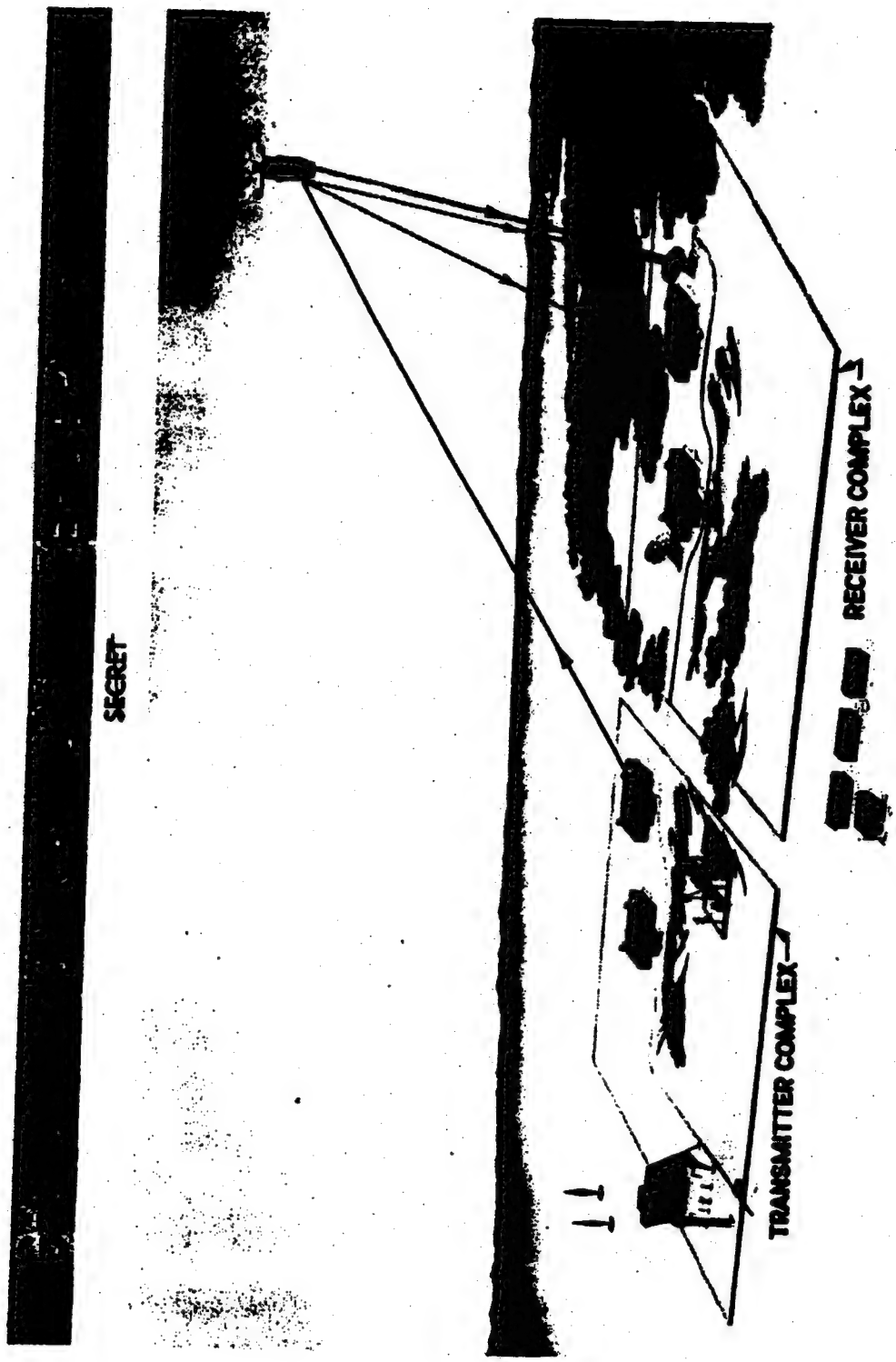

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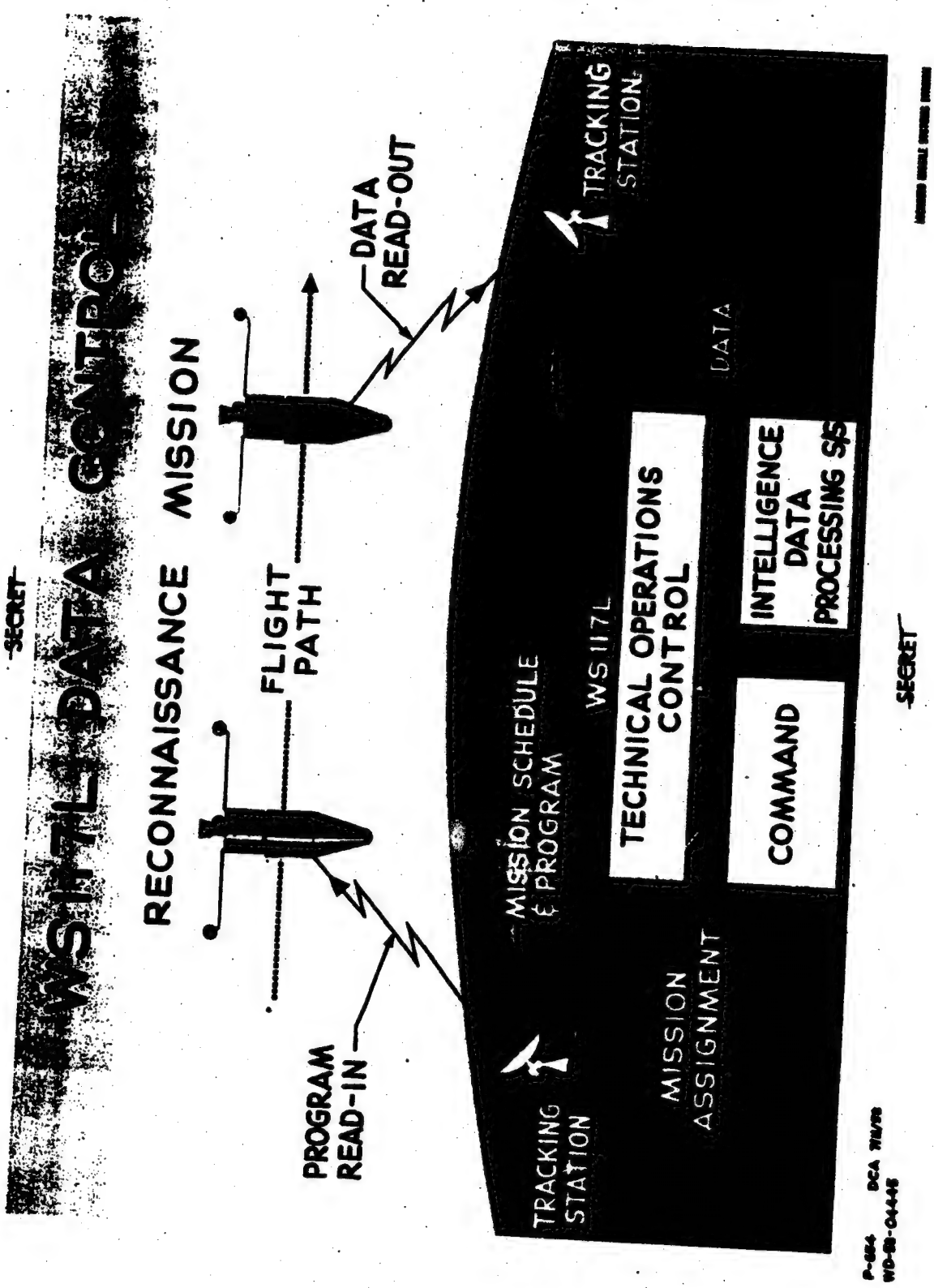

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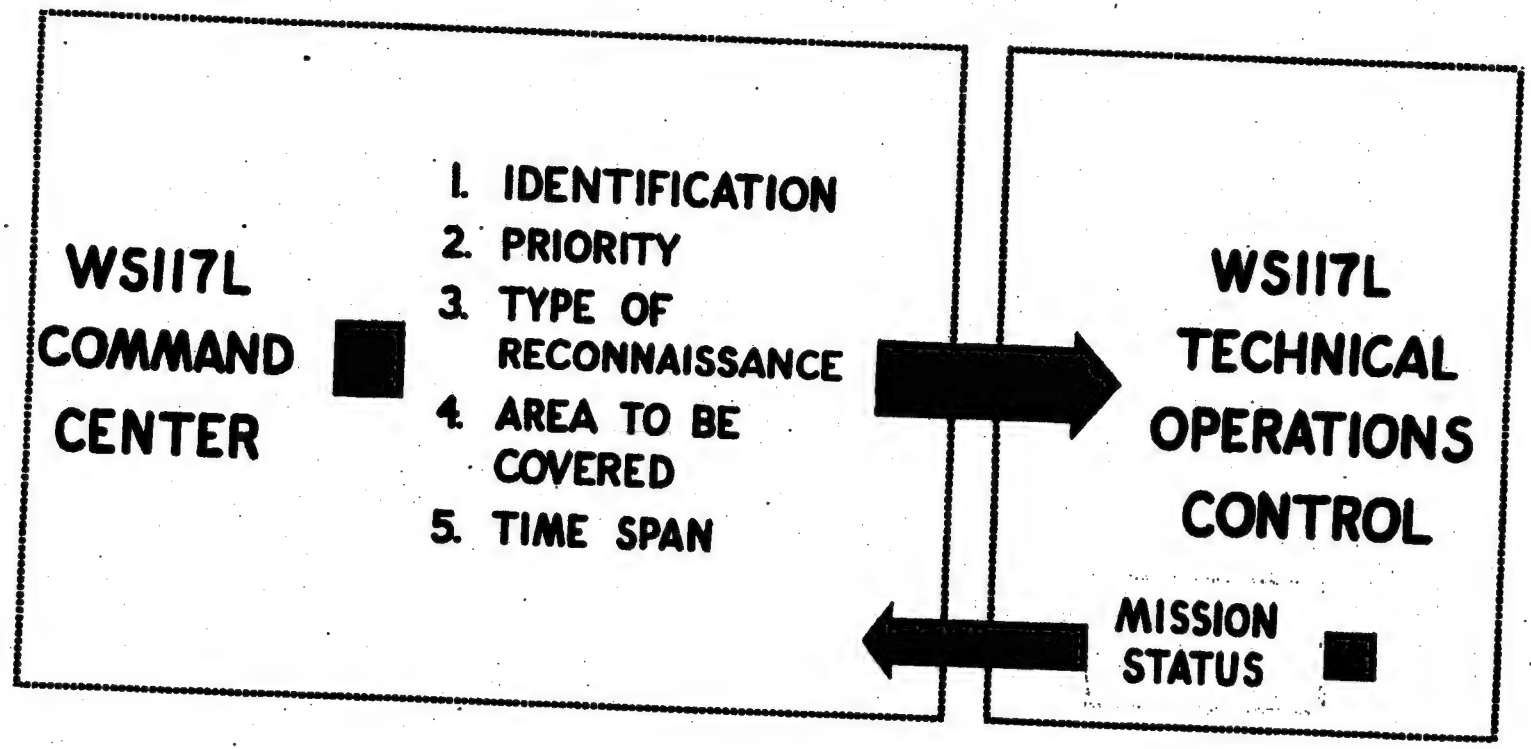
WS117L DATA CONTROL

RECONNAISSANCE MISSION ASSIGNMENT



P-685 DCA 7/11/59
WD-59-04445

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WS117L DATA CONTROL

DATA INDEXING

TRACKING DATA →

ATTITUDE →

VEHICLE TIME DRIFT →

PERFORMANCE DATA

CALIBRATION DATA

PERFORMANCE STANDARDS

DATA CONTROL OPERATIONS → INTELLIGENCE DATA INDICES

[redacted]

~~SECRET~~

PRIMARY

- LAUNCH OF WS 117L/SM-75 COMBINATION
- ACHIEVEMENT OF ORBIT
- DEVEL. WS117L AIRBORNE & GROUND SYSTEMS
- DEVEL. OF GROUND/SPACE COMMUNICATIONS

SECONDARY

- RECOVERY
- AEROMEDICAL MEASUREMENTS
- G. R. D. MEASUREMENTS

P-465 SO 3/24/58
WD-58-01388

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FLIGHT MISSIONS & OBJECTIVES

PROGRAM II A

FLT.	NOM. CIRCULAR ORBIT ENERGY ALT. S.M.	EMPTY WT. ON ORBIT	ATT.	PAYLOAD	FUEL	NOZZLE EXP. RATIO	FLT. OBJECTIVES
1	225	1275	VERT.		JP4/IRFNA	14.85:1	PHASE A ENGINEERING TESTS
2	190	1359	"		"	"	PHASE A ENGINEERING TESTS
3 & 4	145 (H_p=125 S.M. e=.02 163° LAUNCH AZIMUTH)	1547	HORIZ.	195# CAPSULE ALBEDO FLT. 3 DENSITY FLT. 4	"	"	BIO-MEDICAL EXPERIMENT
5-7-9	240	1458	"	GRD. ALBEDO DENSITY COSMIC RAY	UDMH/IRFNA	20:1	PHASE B ENGINEERING TESTS
6-8 & 10 THRU 14	160 (H_p=140 S.M. e=.02 180° LAUNCH AZIMUTH)	1649	"	250 LB. CAPSULE	"	"	BIO-MEDICAL EXPERIMENT

PS71 (9) 8/4/58
WD-58-04445

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MISSILE SYSTEMS DIVISION
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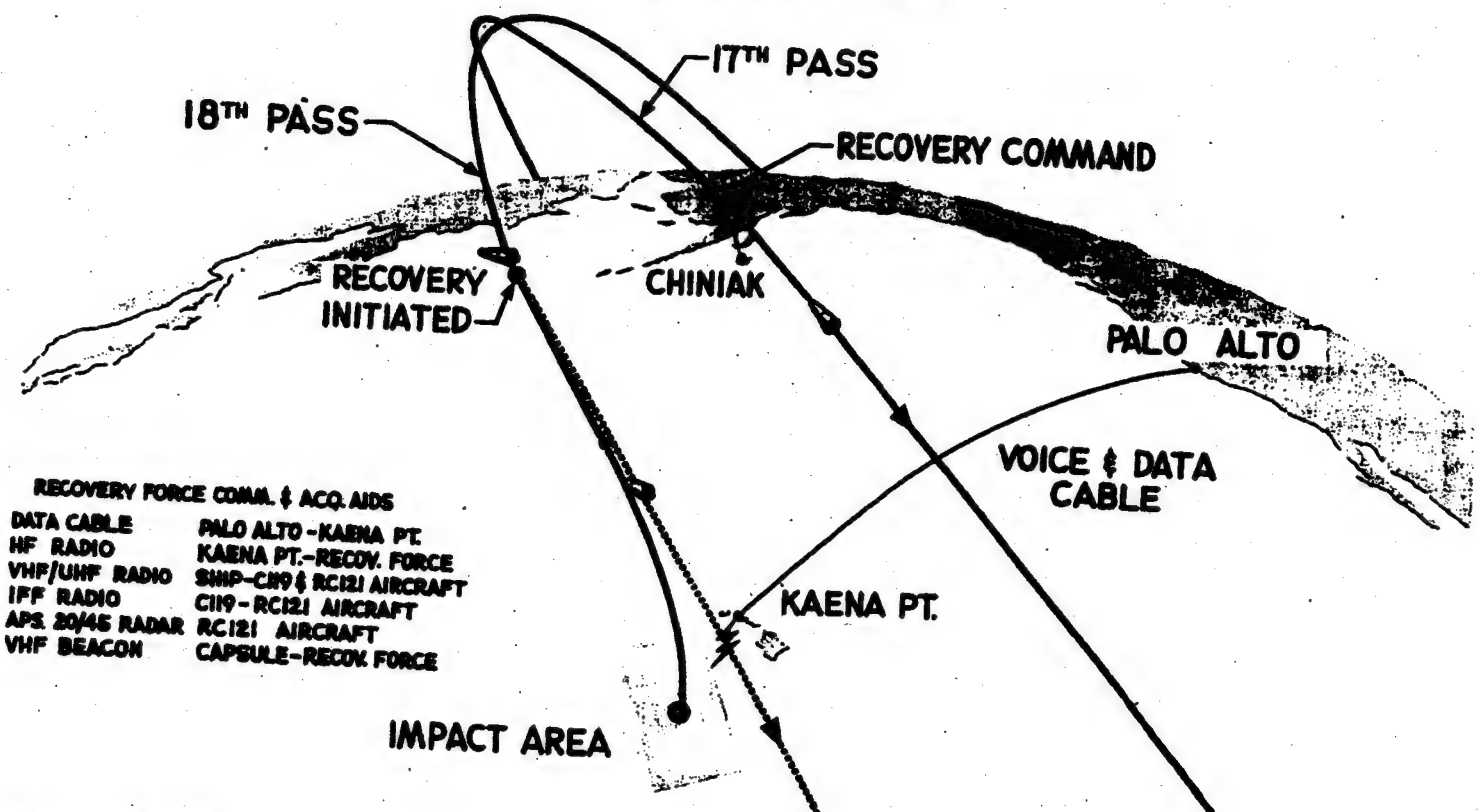
WS117L RECOVERY ORBITS

PROGRAM IIA



RECOVERY FORCE COMM. & ACQ. AIDS

DATA CABLE	PALO ALTO - KAENA PT.
HF RADIO	KAENA PT. - RECOV. FORCE
VHF/UHF RADIO	SHIP - C119 & RC121 AIRCRAFT
IFF RADIO	C119 - RC121 AIRCRAFT
APS. 20/45 RADAR	RC121 AIRCRAFT
VHF BEACON	CAPSULE - RECOV. FORCE

P639 80 7/7/58
WD-58-04445

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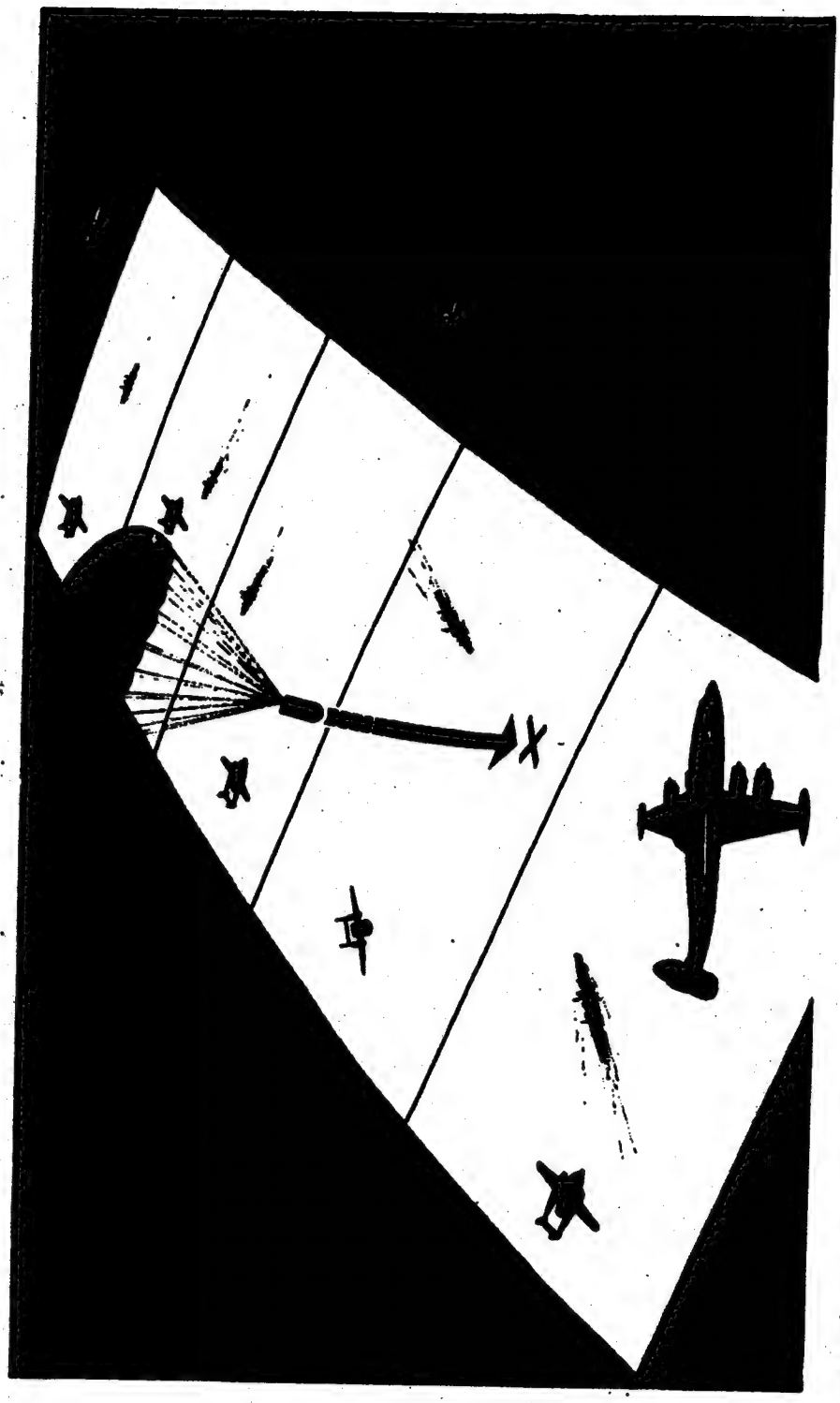
SENTRY RECOVERY OPERATIONS



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MISSILE SYSTEMS DIVISION

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P 621 (2) SO 6/24/59
WD-59-04485

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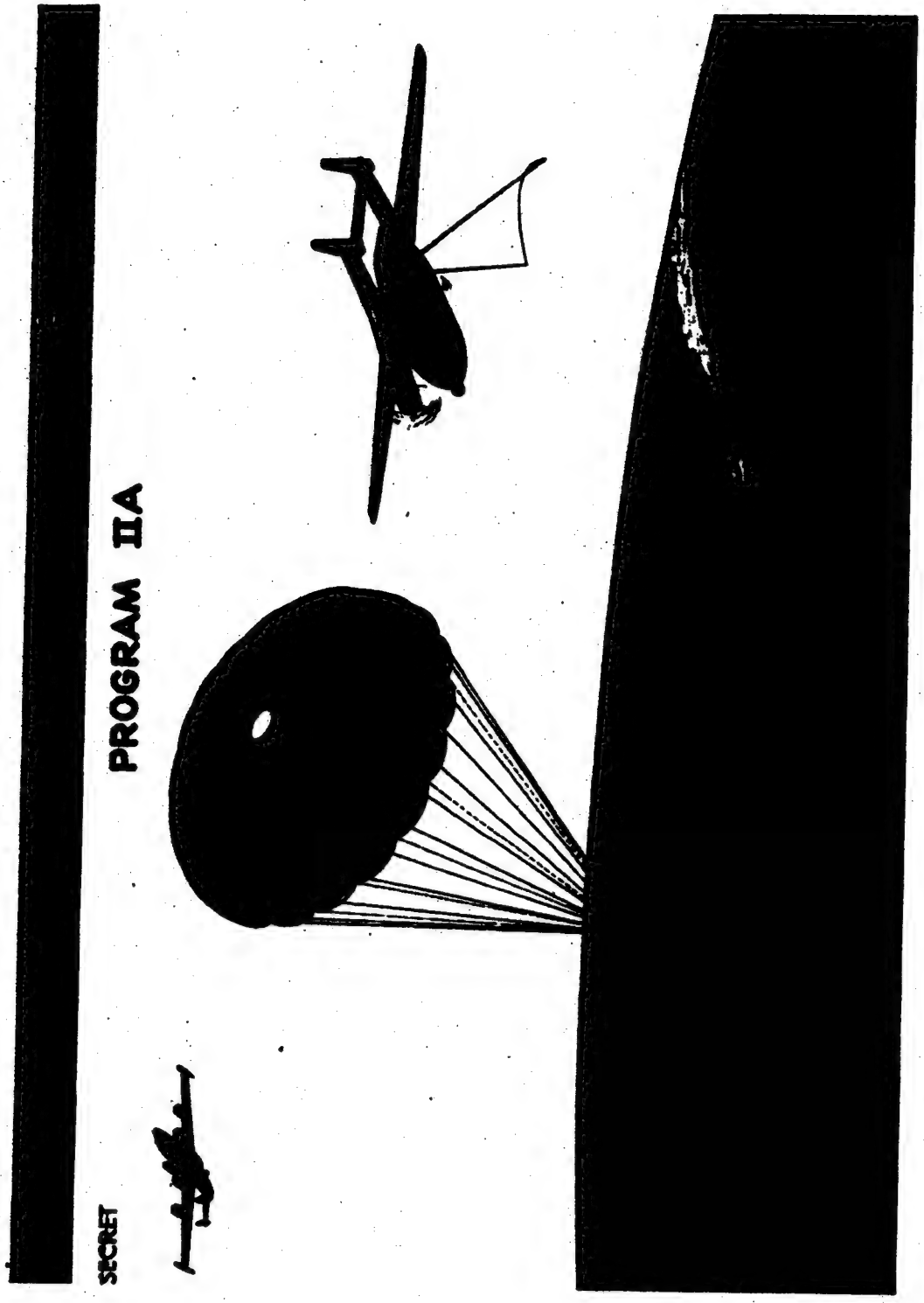

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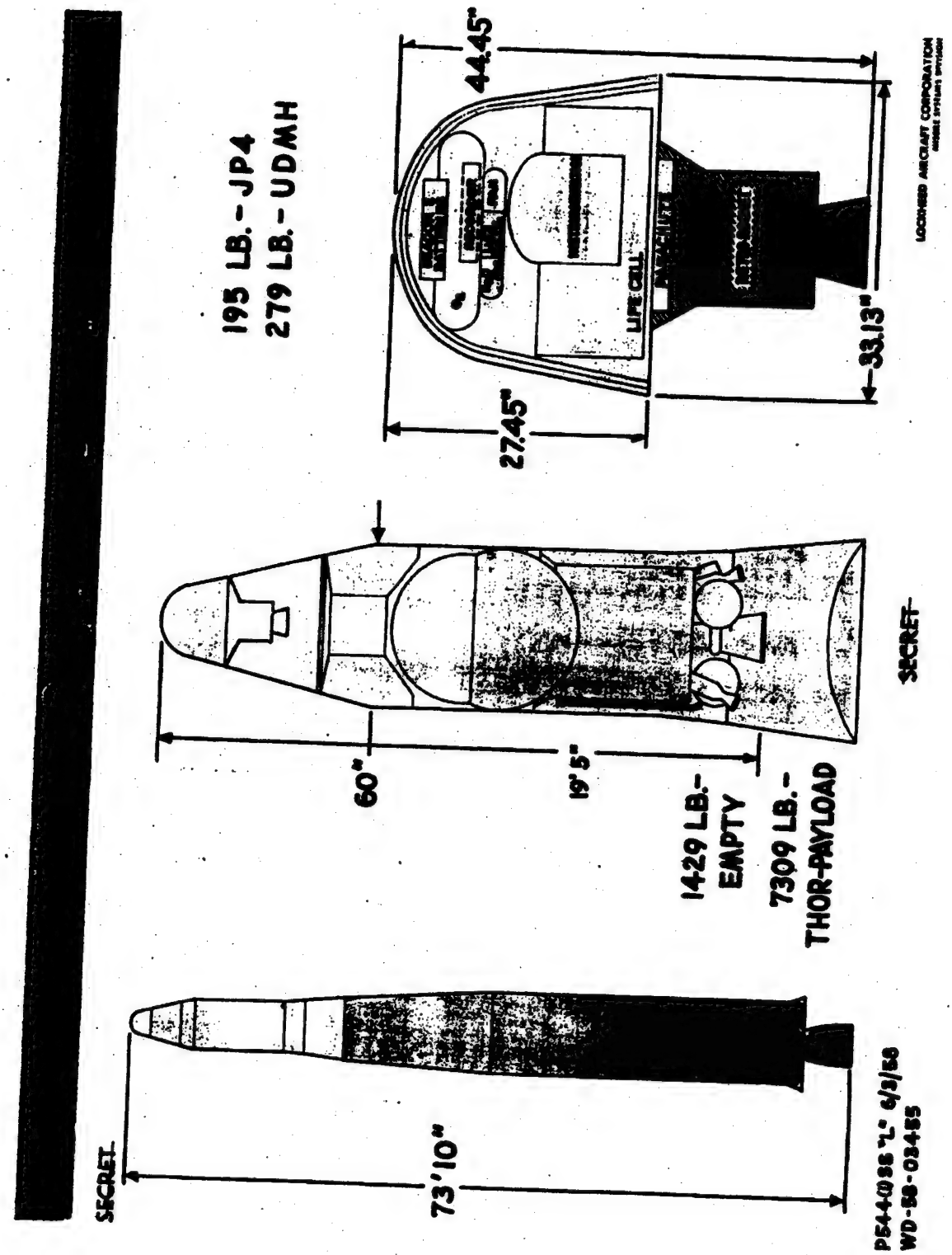

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[redacted]

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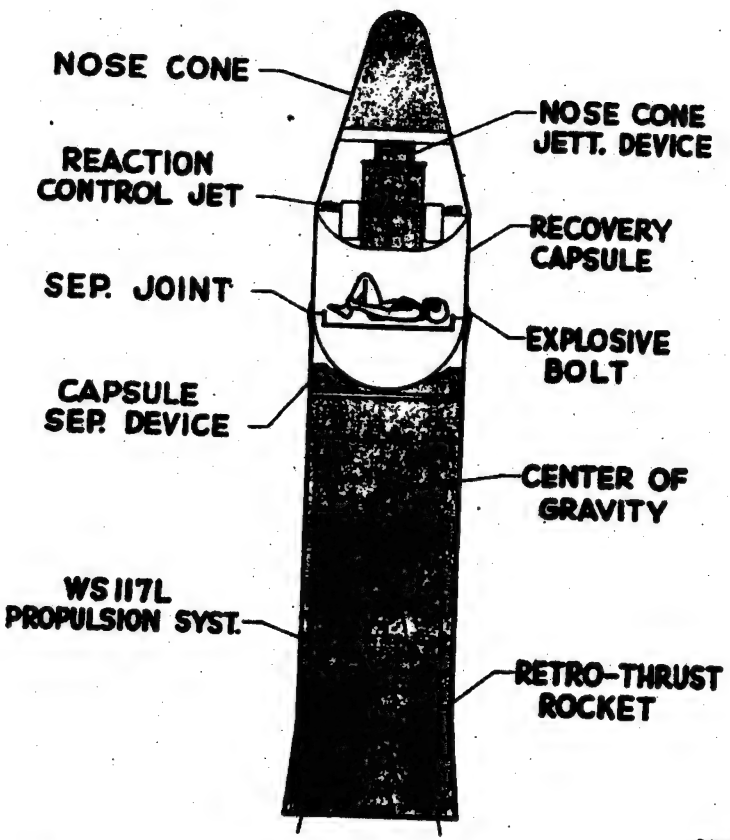
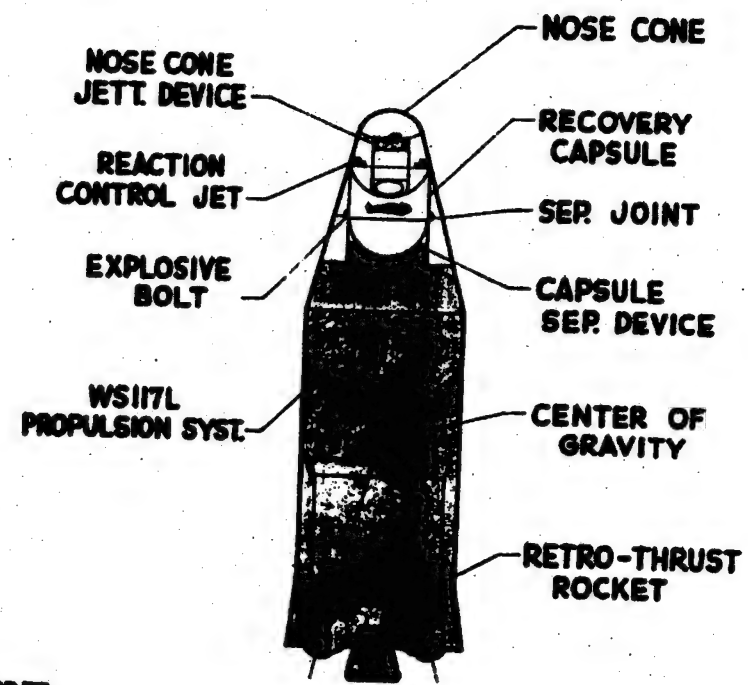
MAN



SMALL ANIMAL



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P475 S 4/30/58
WD-58-0275

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

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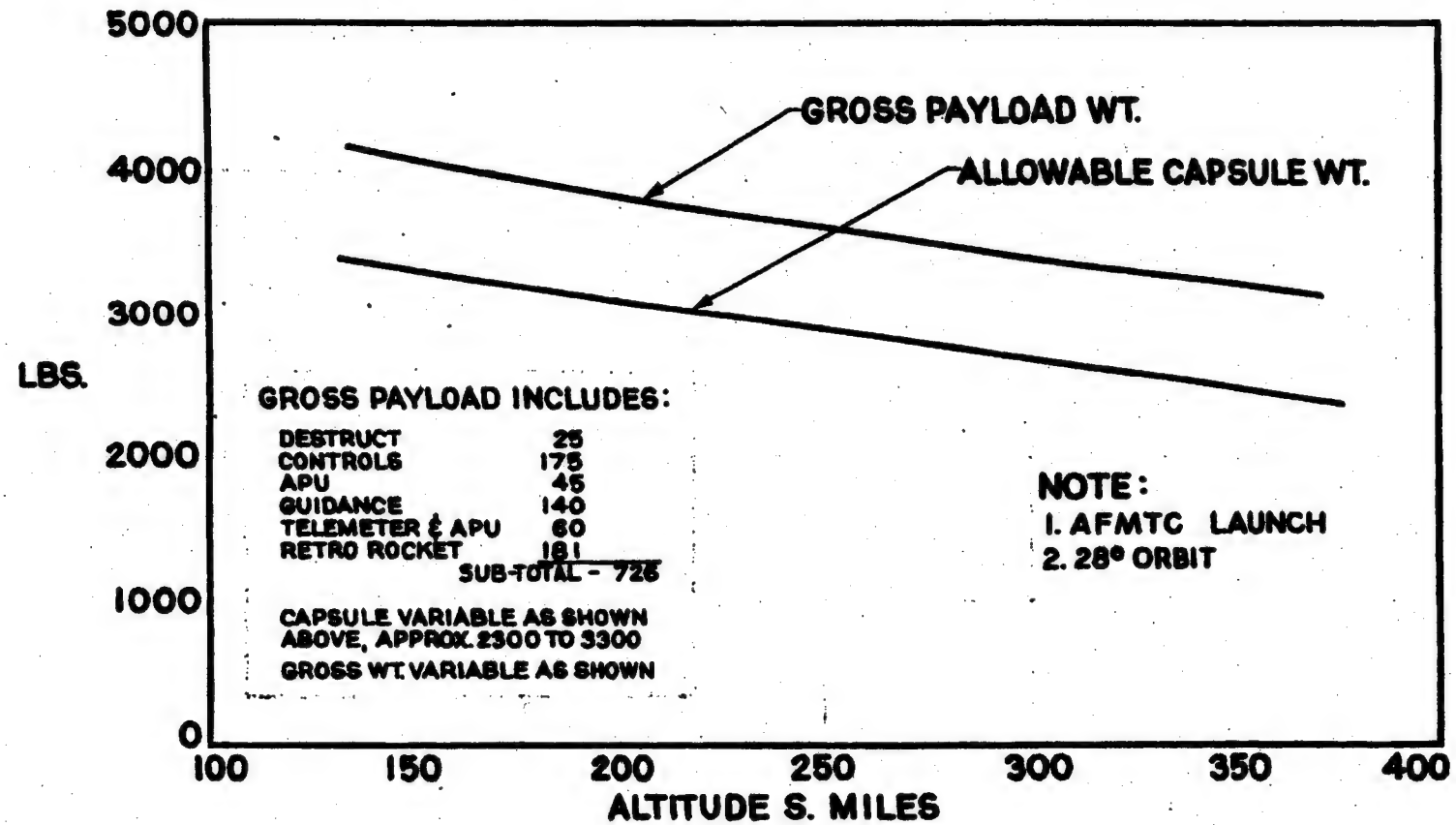
PROPOSED MAN IN SPACE PROG.



P503 SS "L" 6/3/58
WD-58-03455

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SATELLITE WEATHER MISSIONS

~~CONFIDENTIAL~~

SCIENTIFIC RESEARCH
- DETERMINE MEANS FOR UTILIZING SATELLITE DATA
- CORRELATE DATA OVER LARGE AREAS OF EARTH
- PERFORM STUDIES ON WEATHER CONTROL

STORM PATROL
- DETECT PRESENCE OF MAJOR STORM CENTERS
- PERFORM TIMELY TRACKING AND WARNING

DOMESTIC WEATHER FORCASTING
- AUGUMENT PRESENT SYSTEM OF STATIONS
- PROVIDE ADDITIONAL COVERAGE

MILITARY MISSIONS
- WEATHER DATA FOR OPERATIONAL MISSIONS
- INTELLIGENCE INFORMATION
- WS-117L TECHNICAL SCHEDULING

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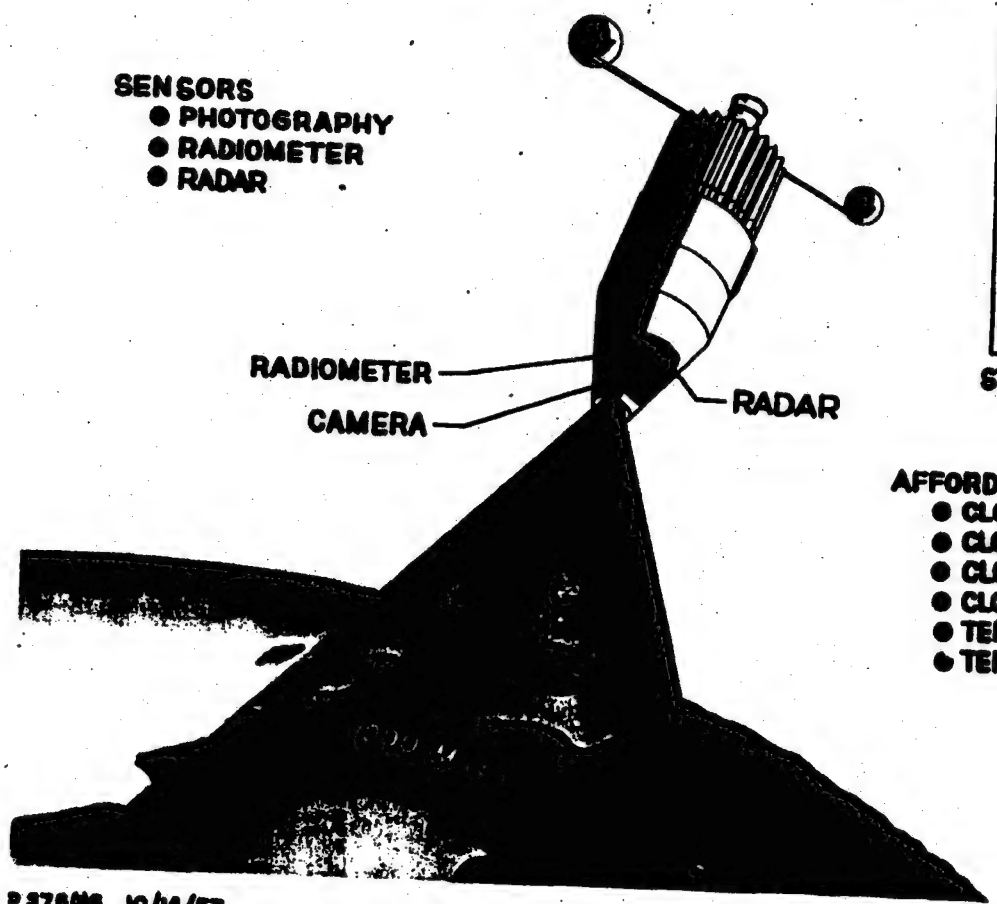
SENTRY WEATHER SURVEILLANCE

SENSORS
- PHOTOGRAPHY
- RADIOMETER
- RADAR



STATUS MOSAIC AT WEATHER CENTER

AFFORDS SYNOPTIC RECORD
- CLOUD TYPE
- CLOUD COVER
- CLOUD VELOCITY
- CLOUD ALBEDO
- TERRESTRIAL RADIATION SPECTRUM
- TERRESTRIAL HEAT BALANCE

P 376[illegible] 10/14/57
WD-58-05183

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TYPES OF WEATHER DATA

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MILITARY AND DOMESTIC

PRESENT METHODS

- TEMPERATURE
- PRESSURE
- HUMIDITY
- WIND VELOCITY
- RECENT WEATHER HISTORY

SATELLITE DATA

- VISUAL
  - CLOUDS - SEMI QUANTITATIVE
    1. EXISTENCE
    2. WIND VELOCITY
    3. WIND SHEARS
    4. VERTICAL STRUCT
    5. WATER VAPOR
    6. AIR STABILITY
    7. LEE CLOUDS OVER MOUNTAINS
    8. FRONTAL CLOUDS
- RADIO METRIC
  - ALBEDO
  - OZONE CONCENTRATIONS
  - SOLAR RADIATIONS
- RADAR
  - PRECIPITATION
  - ALBEDO

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POSSIBLE SCIENTIFIC EXPERIMENTS

UTILIZING WS-117L VEHICLE

	LARGE PAYLOAD	DATA STORAGE & WIDE-BAND TRANSMISSION	LARGE POWER (LONG LIFE)	POLAR ORBIT	CONTROLLED ATTITUDE	INTER-SATELLITE COMM.	COINCIDENCE-TYPE EXPERIMENTS
DRAG							
SOLAR UV, X-RAYS, & TOTAL RADIATION		▲	▲		▲		
PRIMARY AND ALBEDO COSMIC RAYS	●	▲	▲	●	▲		
AURORAL PARTICLES AND X-RAYS		▲	▲	●	▲		
MICROMETEORITES		▲	▲		▲		
MAGNETIC FIELD		●	▲	●			
EARTH RADIATION		●	▲	●	●		
ALBEDO AND CLOUD COVER		●	▲	●	●		
LIGHT ION DETECTOR		●	▲	●			
ION SPECTROMETER	●	●	▲	●	▲		
MICROMETEORITE VELOCITIES		▲	▲		●		
LYMAN-ALPHA TELESCOPE	●	▲	▲		●		
ATOMIC CLOCK	●		▲				
ELECTRON DENSITY IN IONOSPHERE		●	▲	●			
DENSITY AND TEMPERATURE IN ORBIT	▲	●	▲	●	●	●	

▭ NOT NECESSARY FOR THE MEASUREMENT
▲ USEFUL FOR THE MEASUREMENT
● ADDS GREATLY TO VALUE OF MEASUREMENT

P374 G 10/14/57

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MISSILE SYSTEMS DIVISION

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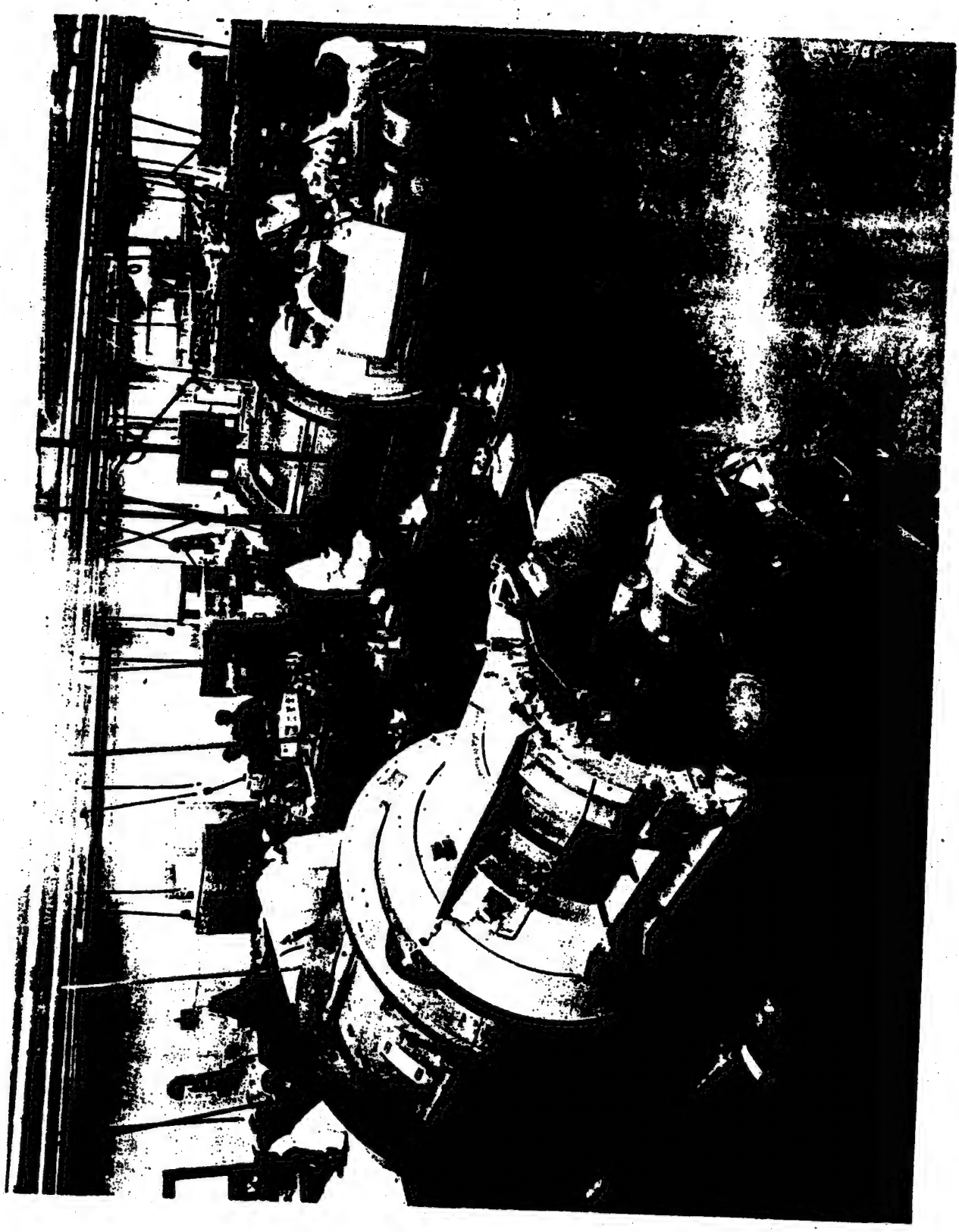
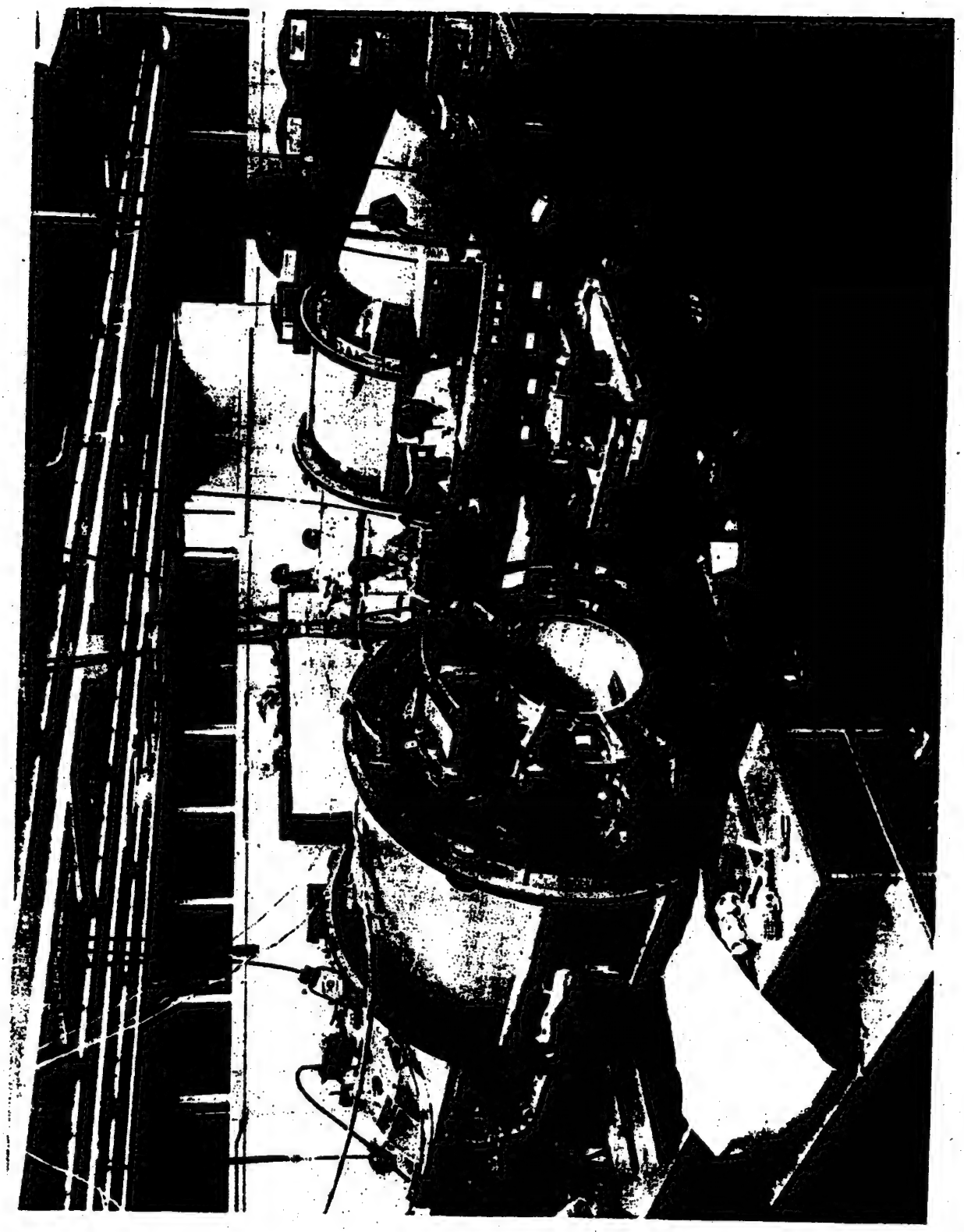


P 2017 FLIGHT TEST VEHICLES NOS. 1 AND 2 IN MOD & CHECKOUT - LMSD PALO ALTO

affecting the national defense of the United States within the meaning of the Espionage Laws Title 18



P2018 FLIGHT TEST VEHICLES NOS. 1 AND 2 IN MOD & CHECKOUT - LMSD PALO ALTO

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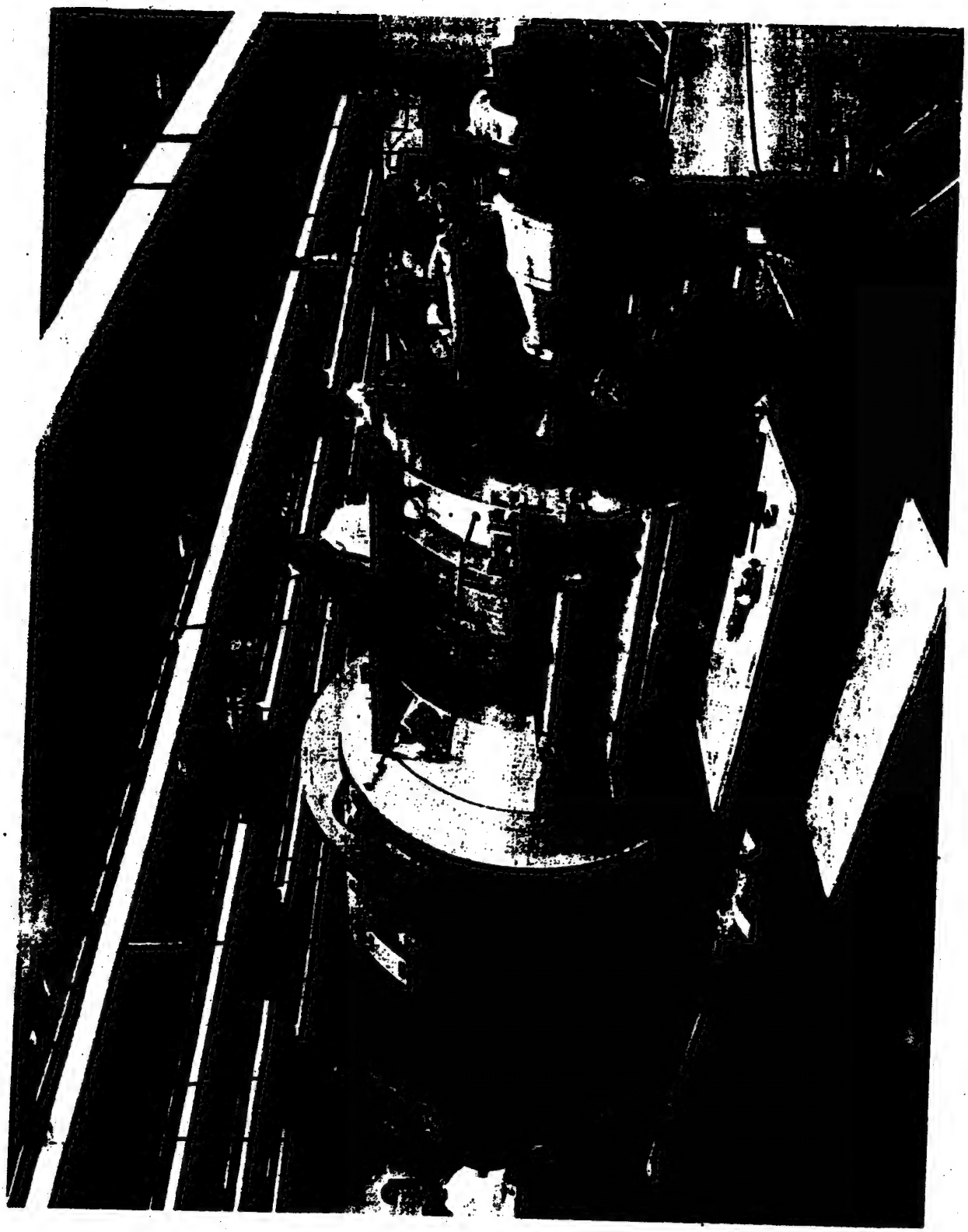

P2022 FLIGHT TEST VEHICLE NO. 2 IN MOD & CHECKOUT - LMSD PALO ALTO

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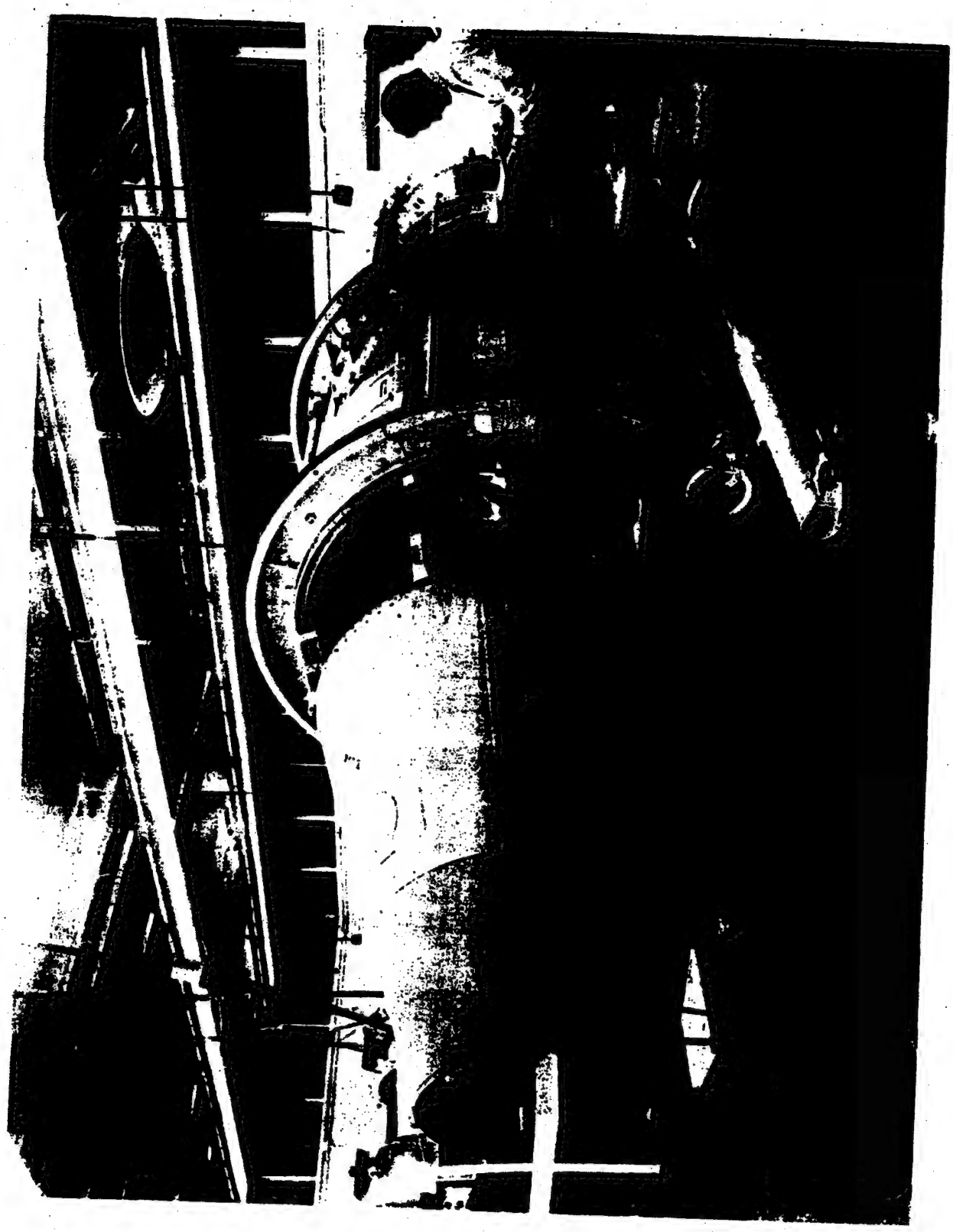

P-3021 FLIGHT TEST VEHICLE NO. 2 IN MOD & CHECKOUT - LMSD PALO ALTO

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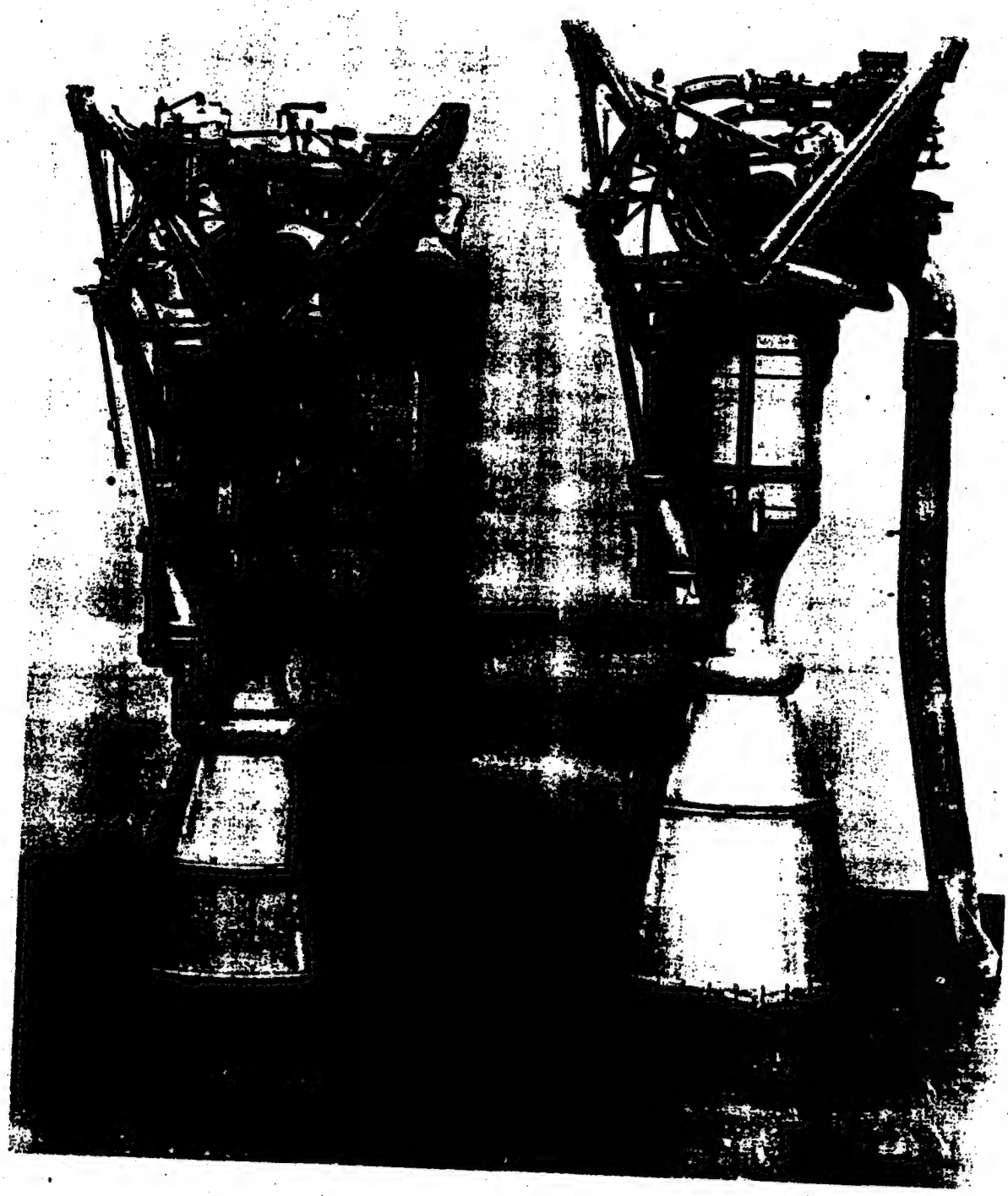
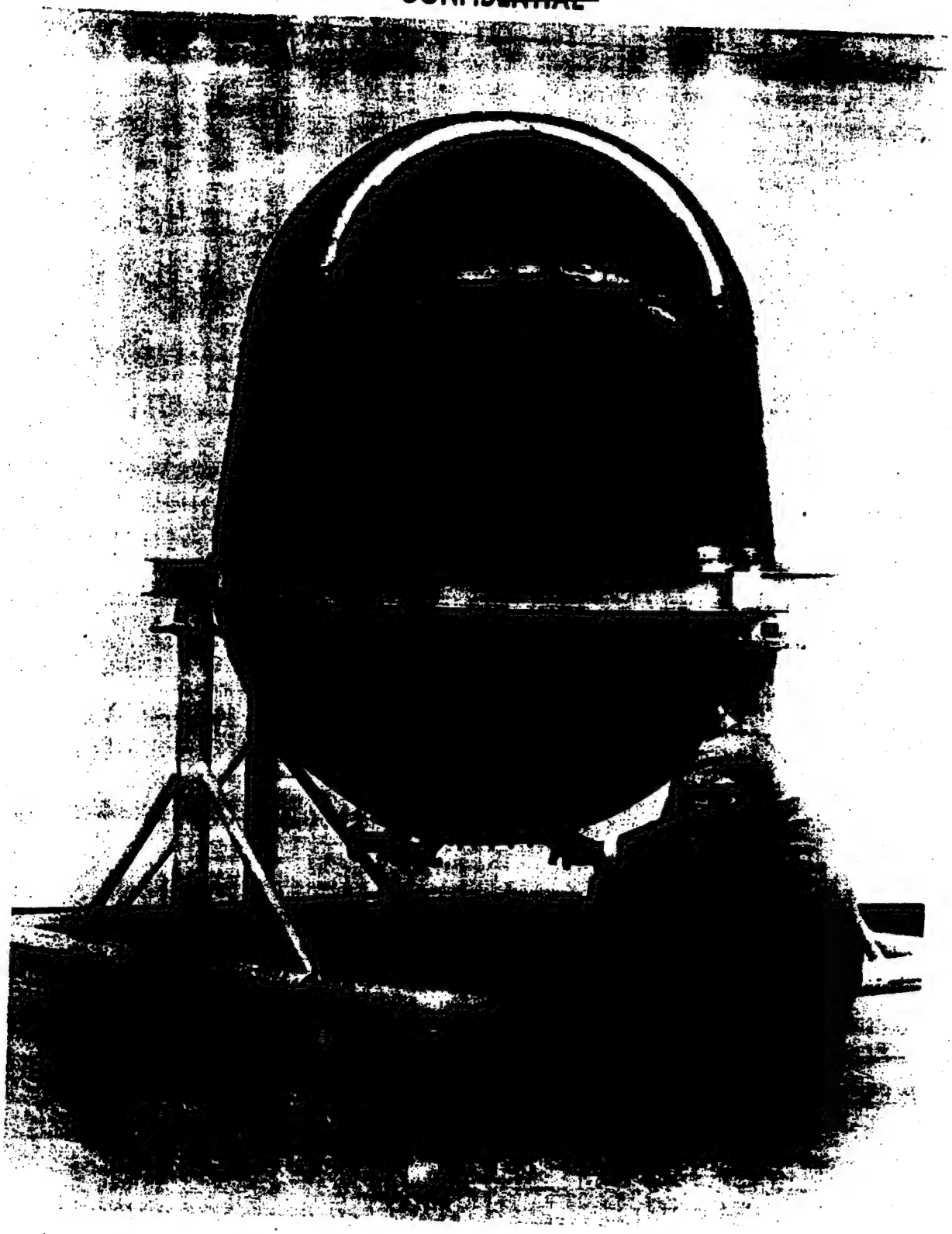
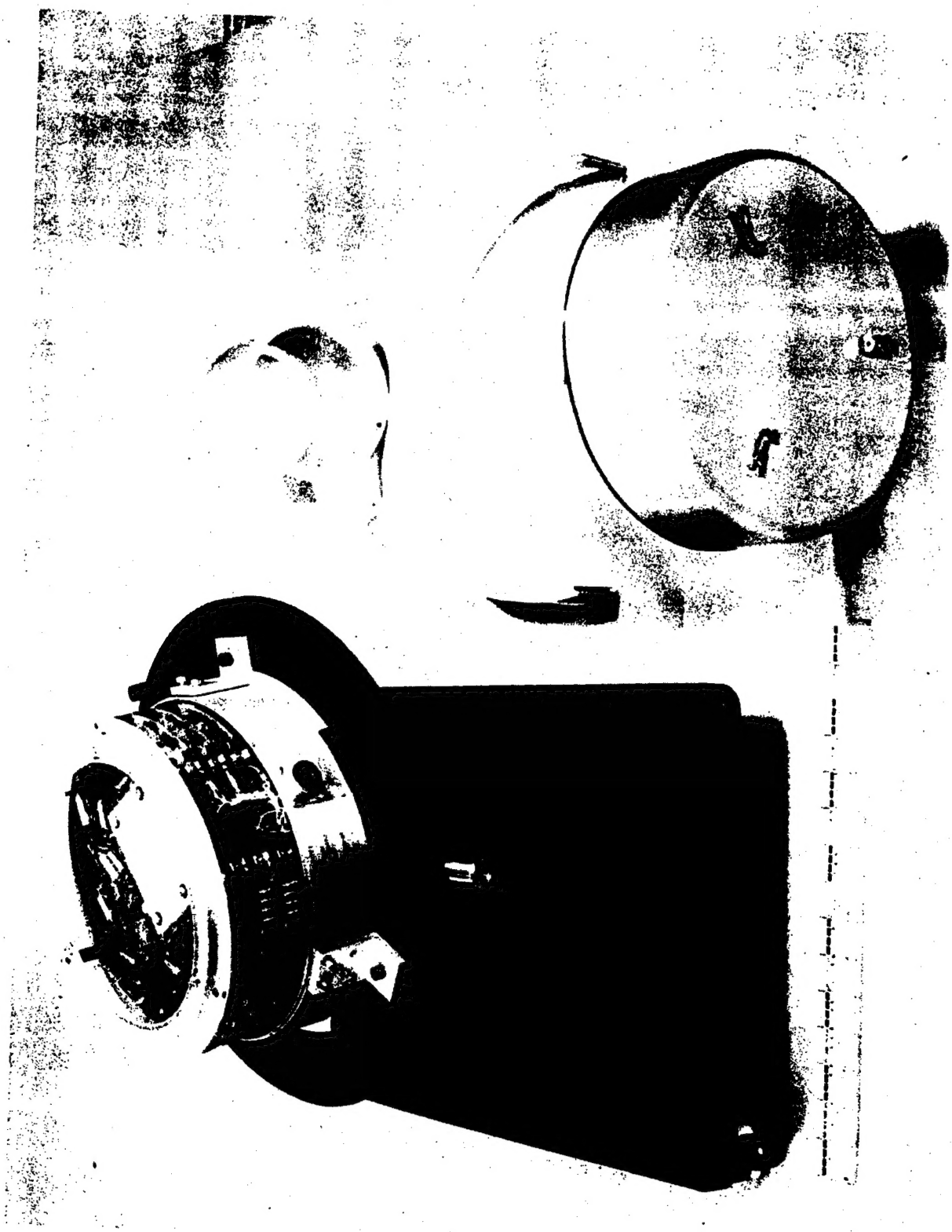


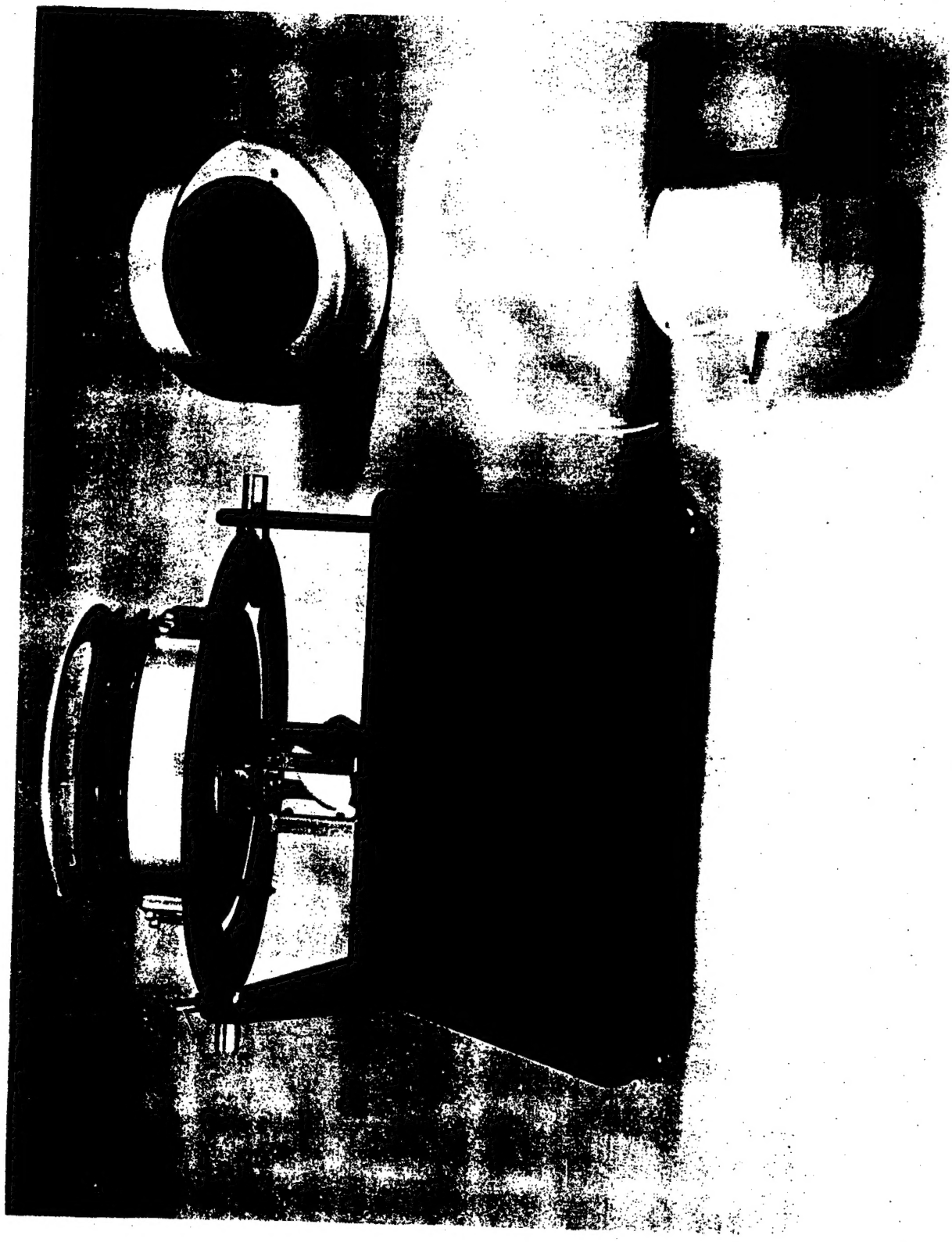
P3039 MODEL XLR ENGINES - JP4 (LEFT) AND UDMH



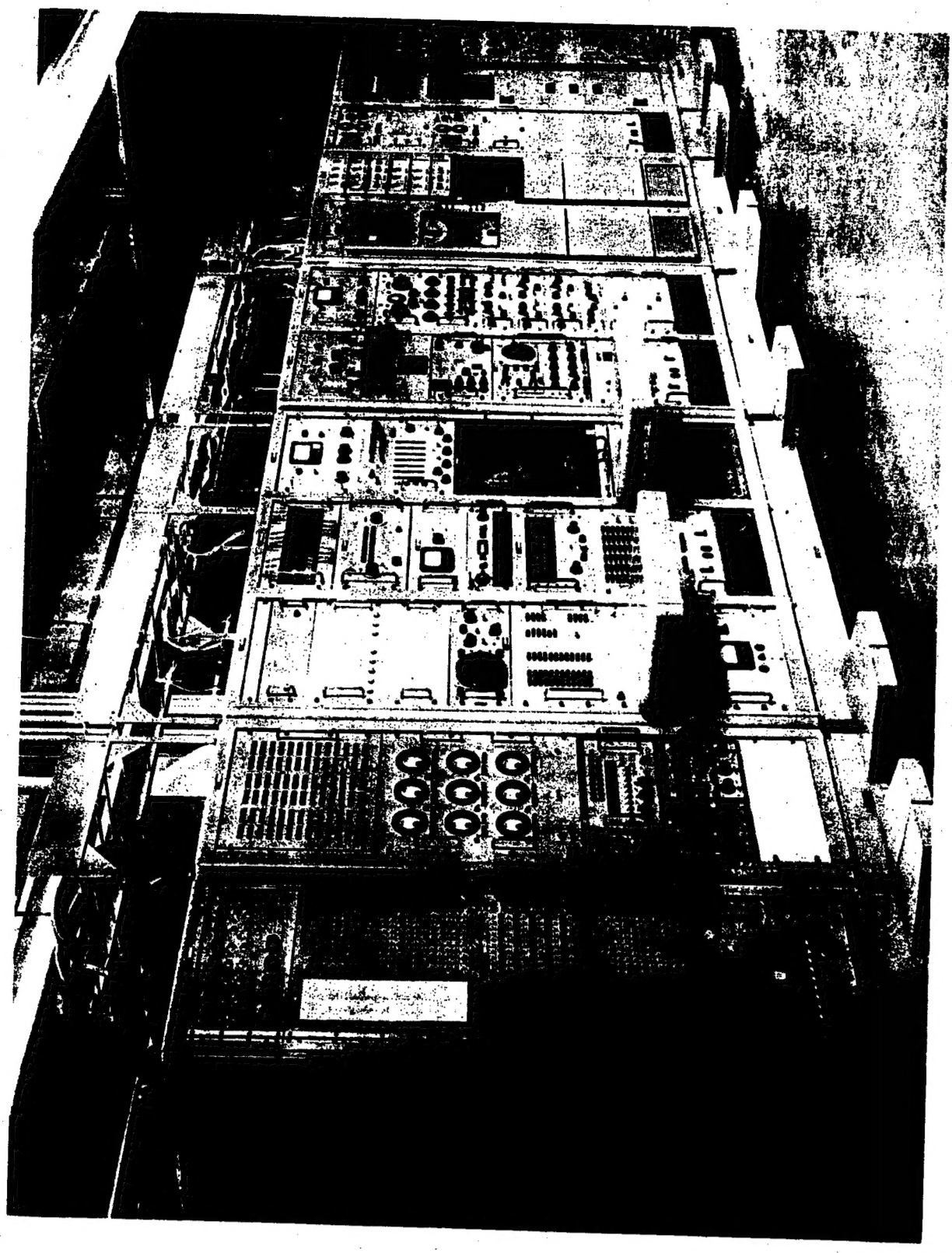
P3043 UDMH PROPELLANT TANK



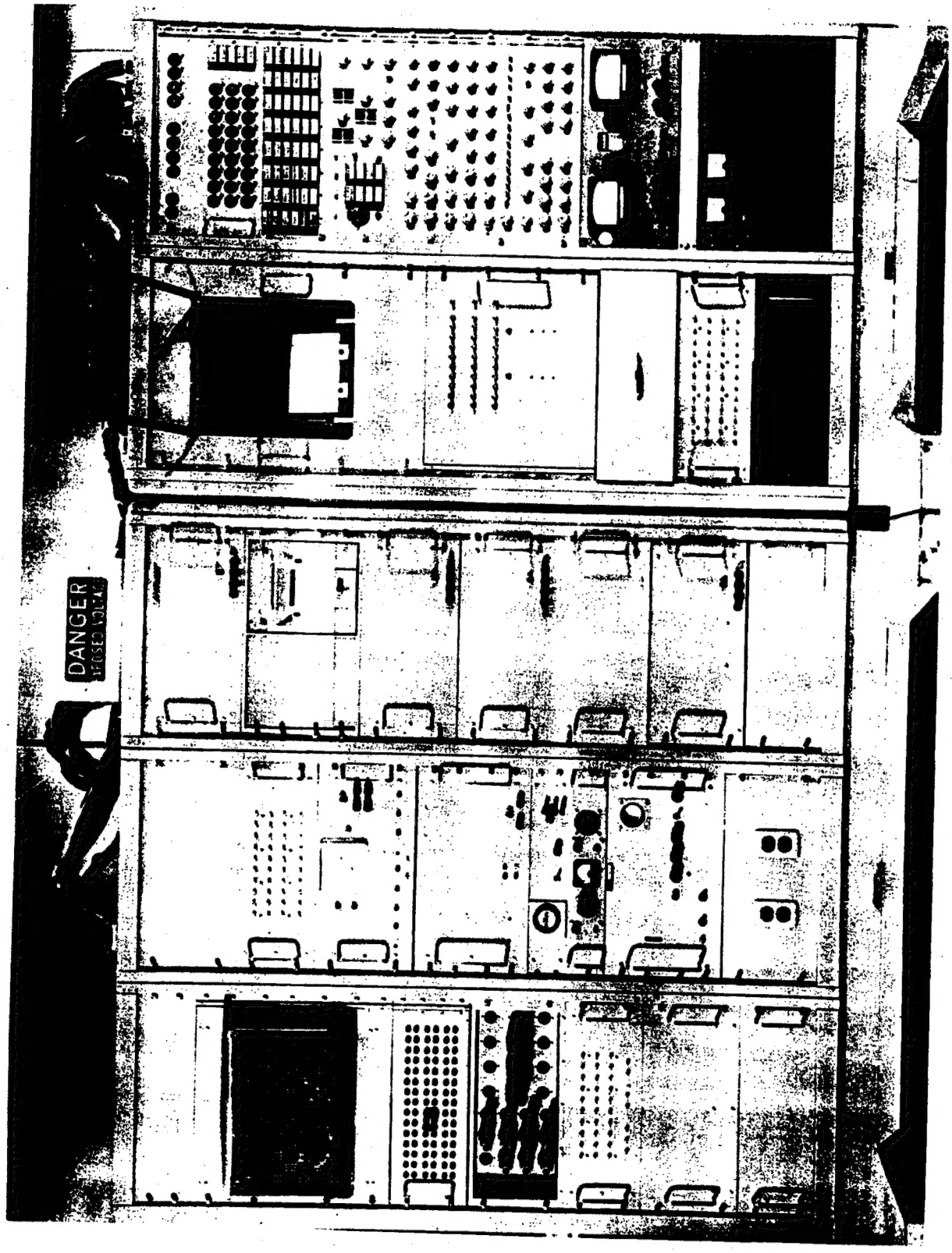
P2862 HORIZON SCANNER



P 2864 HORIZON SCANNER



P3046 SYSTEMS CHECKOUT COMPLEX (EXCLUDING LACE UNIT)



P3047 LACE UNIT (SYSTEMS CHECKOUT COMPLEX)